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ANNUAL REPORT OF
MARKETING AND FACILITIES RESEARCH BRANCH
FOR THE FISCAL YEAR ENDED JUNE 30, 1950



UNITED STATES DEPARTMENT OF AGRICULTURE
PRODUCTION AND MARKETING ADMINISTRATION
WASHINGTON, D. C.

**ORGANIZATION OF THE
MARKETING AND FACILITIES RESEARCH BRANCH**
William C. Crow, Director

**MARKETING FACILITY PLANNING IN
SPECIFIC LOCALITIES**

C. J. Otten, In Charge

Develops plans and promotes the construction of the proper kinds of marketing facilities for all kinds of farm and food products at various stages in the marketing channel in specific localities; determines the type, size, location, design, cost, and method of financing and operation best suited for the specific locality; and determines the financial soundness of the proposed facility.

**MARKETING FACILITY AND MATERIALS -
HANDLING PRINCIPLES**

W. H. Elliott, In Charge

Conducts studies to determine the principles that should be followed in ascertaining the proper size, lay-out, location, and method of financing and operating marketing facilities and to determine the best kind or kinds of equipment for use in handling products at various stages in the marketing channel. The principles developed are followed in planning marketing facilities and equipment to fit specific localities and areas.

**TRANSPORTATION FACILITIES,
EQUIPMENT, AND LOADING
METHODS**

J. C. Winter, In Charge

Conducts research on transportation for all types of agricultural commodities including but not restricted to studies and investigations of transportation facilities, methods, equipment, practices and operations, and studies of transportation, legislation, policies, and regulations in order to increase transportation efficiency, reduce costs, improve quality, and generally to expand the distribution of farm and food products.

**MERCHANDISING, PACKAGING,
AND OTHER MARKETING
FUNCTIONS**

R. W. Hoecker, In Charge

Conducts research on merchandising, packaging, wholesaling, retailing, storage, or other subjects where the emphasis is primarily on the function rather than on the commodity in order to increase efficiency, reduce costs, improve quality and consumer acceptability, and generally to expand the distribution of farm and food products.

TECHNICAL PROGRAMS

K. J. McCallister, In Charge

Conducts studies and investigations to develop technical improvements which will increase the effectiveness of market news, inspection, and grading programs.

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ANNUAL REPORT OF MARKETING AND FACILITIES RESEARCH BRANCH

For the Fiscal Year Ended June 30, 1950

INTRODUCTION

The function of the Marketing and Facilities Research Branch is to conduct cross-commodity marketing research on the various marketing functions and to promote the improvement of facilities used at various points in the marketing channel for the physical handling of agricultural commodities. More specifically, the Branch develops plans for and promotes the construction of market facilities for handling the various kinds of farm products in producing areas, terminal and secondary markets; makes studies to find out how the costs of physical handling can be reduced through proper use of the most suitable kinds of handling equipment; conducts research to determine the principles that should be followed in planning market facilities of all types; makes studies to find out how to improve the merchandising, packaging, retailing, and transportation of farm and food products; and engages in research to improve the market news, standardization, and grading programs. All of the work of the Branch is financed with funds from the Research and Marketing Act of 1946 and the Marketing Farm Products appropriation.

The objective of all of this work is to facilitate the operation of the private marketing system for farm and food products by improving the efficiency of marketing, cutting the costs of distribution, and expanding the outlets for farm products. It should be noted that the Branch concerns itself only with marketing problems that are common to a number of commodities. Many of the most important problems in the market field cut across commodity lines. To illustrate, transportation facilities must be planned and used to accommodate a great variety of commodities. Many kinds of warehouses are used for storing numerous products, and the main problems of warehouse operation are essentially the same regardless of the commodity handled. Wholesale market facilities handle a great variety of commodities purchased by retail stores, and retail stores, of course, handle several thousand items. Materials-handling equipment and its use depend largely on the circumstances, size, and weight of the package rather than on the commodity contained in it; and many aspects of market news and grading programs cut across commodity lines. Some marketing problems can best be handled on a functional basis because the principles developed as a result of research on one commodity can, with very little adaptation, be applied to other commodities and commodity groups. It is for these reasons that there is a need for cross-commodity work at numerous places in the marketing channel where the commodity involved is not the primary subject for investigation.

This report was prepared for the purpose of recording the most important activities in each of the fields in which the Branch works for the fiscal year which ended on June 30, 1950. At the end of this report will be found a list of all the recent publications of the Branch, which of course report more fully on the individual projects. Copies of these publications are available on request.

A large part of the work of the Branch is done in cooperation with other agencies and groups that are concerned with marketing. The Branch works extensively with State agricultural colleges, State departments of agriculture and bureaus of

markets, municipalities, the various trade organizations concerned with marketing, farmers and farm organizations, and civic organizations. In addition, important phases of the work for which the Branch is responsible are conducted through contracts with various firms and organizations specializing in particular kinds of work. The cooperation that the Branch has received from all these groups during the past year has been excellent, and much of the credit which may be given the Branch for its accomplishments must be shared with these cooperating agencies.

The work of the Branch is of definite benefit to many groups. By helping to improve the marketing system the Branch is giving material assistance to the farmer in expanding the outlets for his products and increasing his returns. By helping get the best possible physical handling of these products through the marketing channel the activities of the Branch help the consumer to obtain regularly a larger variety of food products in better condition and at lower prices than would otherwise be possible. By working with wholesalers, retailers, transportation companies, and other persons engaged in the marketing process, the Branch helps these groups improve their efficiency, and hence their competitive position. In a broad sense this work is designed to improve the operation of the private marketing system, so that it may do the best possible job of distributing the products which American farms are able to produce in such great abundance. Physical handling costs--in transportation, wholesale markets, warehouses, and retail stores--constitute a large part of the total marketing bill; hence, programs to reduce these costs and eliminate as many unnecessary handlings as possible constitute a large portion of the job in improving marketing.

During the past year there has been a tremendous growth in interest in improving market facilities of all types for handling the different kinds of agricultural commodities throughout the country. The year ended with requests on hand for assistance in planning facilities in more than 30 localities. During the year, upon request, work was done in planning and promoting the construction of the necessary market facilities in 24 cities and producing areas located in 16 States and 1 territory. In the conduct of each of these studies facilities for handling various agricultural commodities in the locality were carefully analyzed in order to determine the defects in handling methods and facilities being used and to measure the extent to which each defect increased the marketing cost. The kind, size, amount, and cost of facilities needed to handle products efficiently were determined. The availability and cost of satisfactory sites for the facilities were ascertained, and definite plans were drawn up for the kind of facility that would best meet the present requirements of the locality and provide for reasonable future expansion. As each study is completed, a report is prepared and published which sets forth all the facts and recommendations. New facilities are never recommended unless their construction would either reduce the cost of handling the products concerned or expand the outlets for farm products, or both.

The types of facilities usually included in a market plan for a particular locality are stores for the wholesale handling of the various types of commodities, sheds with platforms underneath where farmers and truckers may sell their own products, rail sidings to buildings to handle a sufficient number of cars to meet

the unloading and loading requirements, team track yards, refrigeration facilities, packing sheds, parking areas, offices, and auxiliary facilities. It is always recommended that the initial construction be limited to the amount of facilities that can be immediately leased to satisfactory tenants, but the lay-out is so drawn that it will be possible to make such additions to the facilities from time to time as may be needed to meet changing conditions. Furthermore, the facilities are so planned that they can be readily adapted to changes in organization of the marketing system. To illustrate, if wholesale market operations should tend to become concentrated in a smaller number of large wholesale institutions serving specific groups of retailers, the facilities planned for smaller wholesalers can be satisfactorily adapted to larger wholesalers' requirements merely by taking out removable partitions. The locations recommended for these markets are determined by the same factors used in determining the proper location for any wholesale food distributor. The facilities proposed are to a great degree interchangeable among commodities and with slight modifications can handle either fresh or frozen products.

For the largest market studied during the year--Boston--plans were developed for the building of some 460 wholesale store units, railroad tracks for approximately 1,000 cars, parking space for about 2,500 trucks, and other facilities in proportion. This market with the necessary space for expansion would require some 170 acres of land, and the total cost of the facility would amount to about 14 million dollars. The smallest market for which plans were developed would cost only a few hundred thousand dollars.

Projects completed in previous years have resulted in the construction of new markets in six localities and improvements in three. In eight other localities construction either has started or is about to begin.

The construction of these improved market facilities brings benefits to a number of groups by reducing the cost of distribution through elimination of unnecessary cartage and other excess handling, reducing financial and physical losses from spoilage and deterioration, reducing the time required of farmers, dealers, truckers, and buyers in the transaction of their business, and facilitating trading and proper price-making by bringing together into one area a complete line of commodities needed by buyers. Thus, farmers are given better outlets for their products, and consumers higher quality commodities at lower prices. In Boston the facilities proposed would reduce measurable handling costs by about four million dollars annually, and make possible many other savings which cannot be measured. Savings in smaller places, of course, would be less.

For the marketing system to be efficient it is necessary not only to have the proper kind of market facilities at the various points in the marketing system, but also to have the right kinds of equipment to move commodities into, within, and out of these facilities, and to use such equipment properly. Too little attention has been given to the adoption of labor-saving devices in the handling of farm and food products in the marketing channel. Both farms and manufacturing have been mechanized, but this same degree of mechanization has not been applied to distribution. For this reason, at many stages in the marketing channel labor is relatively unproductive because it has no satisfactory equipment to work with and many operations are

performed which are not necessary at all. In other places, the equipment available is not being efficiently used because of the failure to get proper balance between consecutive operations in the handling process. With increasing wage rates and some shortages of labor, there is growing pressure to provide labor with the necessary kinds of equipment to permit it to increase its productivity. Unless this labor in the marketing channel can be made more productive and unnecessary handling operations be eliminated, it probably will be impossible to halt the trend toward higher marketing costs with higher prices to consumers and lower returns to growers.

The specific objectives of the work of this Branch in the materials-handling field are to determine the comparative efficiencies of different types, or combinations of types, of materials-handling equipment for the physical handling of packages of farm products in packing houses, stores, and warehouses; to determine the amounts of equipment needed for the most efficient handling of specific quantities; and to develop improved methods of using materials-handling equipment for performing these operations.

During the year, the three reports issued setting forth the results of studies in this field attracted widespread attention. One of these reports showed that in the types of operations covered by it, without any change in facilities and without the purchase of any additional equipment, it was possible to reduce the cost of handling up to 40 percent by making proper use of the facilities and equipment already available. In another study, involving the handling of cotton, recommendations were developed which, for the operation involved, would reduce the direct labor cost by more than 62 percent, and in another operation cut it in half. These reports are mentioned here simply to illustrate the magnitude of the savings that can be made in the marketing channel by proper use of the right kinds of materials-handling equipment to move products into, within, and out of the various kinds of marketing facilities.

Before work can be done satisfactorily in planning market facilities for specific localities, considerable research is necessary to determine the principles that should be followed. During the past year, five studies of this kind were conducted, and the results of these studies were made available for use in planning facilities in specific locations. Without a knowledge of the principles that should be followed in planning, designing, locating, and operating a market facility of any kind, the facilities constructed cannot be expected to operate efficiently and investors in such facilities face a greater risk of loss of their investment. There are many cases of the construction of facilities which failed, and such failures could have been avoided if the facilities had been properly planned and operated. These studies of the over-all principles to be followed in improving marketing, transportation, and storage facilities also serve the purpose of pointing out the most common defects in such facilities and reveal the problems and places which should receive specific attention.

An important segment of the field of marketing agricultural products which has been badly neglected is that of retailing. That retailing is a most important part of the marketing channel is obvious when it is realized that it accounts for about 40 percent of the cost of marketing and that it is in the retail store that the

consumer decides what and how much will be bought. For these two reasons, considerable attention must be given to the problems of retailing and to finding ways to make retailing more efficient.

During the past year or two, the Branch has made a small beginning in this field, working in cooperation with retailers, retail organizations, and state institutions. The work that is being done can be illustrated by a project designed to reduce the cost of checking out the purchases of consumers in self-service food stores. In this study, made on a case-study basis, it was determined that 21 percent of the labor cost of operating the retail store was attributable to the check-out operation, and that this operation often constituted a bottleneck in the store with considerable adverse reaction from consumers. As a result of careful analysis of the time requirements and methods of checking out the purchases, a new check-out counter was developed which made it possible for an individual checker to increase her output per hour from 32 to 44 orders. This counter was so designed that in periods of peak sales it could be used as a 2- or 3-man operation, and when used as a 3-man operation, the number of orders that could be checked out per hour was greater than it had been possible to handle formerly with a 4-man operation.

A patent on the check-out counter developed has been applied for, dedicating the invention to public use. One firm which has purchased a large number of these improved check-out counters estimates that their use will result in a saving for that particular organization of from two to four million dollars per year. There is widespread interest in the improved system of checking out on the part of other self-service retail organizations, and it is expected that the methods and procedures developed will be rapidly adopted throughout the self-service food field. Similar work is being done in the retail field in an effort to determine how to reduce the cost of unloading merchandise into the store, pricing the items, and stocking shelves. Attention is also being given to the possibilities of improving the efficiency of retail self-service food store operations by making greater use of prepackaging of such items as meats, fruits, and vegetables in the back room of the store before the products are displayed to the consumer. A report has already been issued on the prepackaging of meats, and other reports in this field will be released from time to time as the work progresses.

It is difficult to overestimate the importance of helping retailers find ways to reduce their operating costs and do a better job of selling farm and food products. Persons interested in agricultural marketing have tended to concentrate their activities on that part of the marketing channel nearest the farm. Thus, the work that the Branch is doing in retailing, from the standpoint of agricultural marketing specialists, is a pioneering endeavor. In order to be sure that the most important problems are studied, that the work is properly carried on, and that the results will be put to use, an advisory committee of retailers has been asked to meet to assist in the development of a program, to guide in carrying it out, and to aid in getting the results put to use. It is felt that only by close cooperation between research people and the industry will it be possible to do the kind of job that is necessary in this field.

In the field of transportation, the Branch carried on three lines of work looking toward: (1) Better utilization of facilities and equipment; (2) improvement

of transportation facilities and equipment; and (3) reduction of transportation losses through developing improved methods of loading, bracing, and shipping agricultural commodities. With most agricultural products grown in specialized producing areas, it is usually necessary to transport them considerable distances to consumers. Otherwise they are of little or no value. It is important to both farmers and consumers that this transportation be economical, speedy, and efficient. The purpose of the transportation research conducted by this Branch is essentially to improve the efficiency and reduce the cost of transporting farm products. Many transportation problems need solution. One problem to which the Branch devoted considerable attention during the past year was that of developing transportation facilities which can move frozen foods at zero temperatures. Equipment which can do this is essential to the proper development of the frozen food industry. Tests were run on a mechanical refrigerator car which will provide either heat or cold and which can maintain a temperature of zero, when necessary. As a result of these tests, one refrigerator car line has already placed orders for about 100 such cars. Tests also have been run on a refrigerator car which will provide zero temperatures without the use of ice or moving parts through the use of liquid ammonia. Work has been started looking toward the improvement of refrigerated trucks so that they may deliver agricultural products to their destinations in better condition, and attention is being given to improving the transportation of grain.

In addition to the work being done to improve transportation facilities and equipment, the Branch has conducted several studies designed to reduce damage and deterioration in transportation by better loading, bracing, and shipping methods. In these studies, representative products are stowed in cars in a variety of ways with different kinds of bracing and padding, and with various quantities in the car, and impact recorders are used to measure shock that the loads may receive while being transported. The contents of the cars are carefully checked at origin and destination in order to measure carefully the relative merits of the different methods that were used in loading, stowing, and bracing the cars. The work that has been done is based on commodities in the fruit and vegetable field, meats, and eggs. The commodities selected for study are those which the records of transportation agencies show incur a great degree of damage in transportation.

The results to date show the possibilities of making significant improvements in the transportation of agricultural commodities through proper handling of the products in the transportation equipment. It is expected that these studies will show the railroads and trucking lines on which the damage is greatest the causes of the damage and perhaps the places and the kinds of equipment in which it occurs most frequently. As a result of these studies, it is expected that transportation agencies will be able to make significant reductions in losses to products being transported.

In all these transportation studies, the problem is being attacked from the point of view of determining what can be done to improve transportation equipment and the methods of transporting so that the various commodities can be handled through the transportation system under the conditions which the commodity specialists have stated to be desirable, with as low costs as possible, and in such a manner as to reach their destination in the best possible condition. Studies of this kind, in order to be most effective of course, require close cooperation with transportation agencies and shippers.

For more than a quarter of a century the Department has conducted market news and grading programs for a large number of farm products. During this long period of operation of these programs, many changes have taken place in the structure of the marketing system and in marketing practices. Methods of transportation have changed; improvements have been made in methods of communication; there has been a tremendous growth in large-scale distribution; and many terminal market facilities have become obsolete. In order that the Department's market news and grading programs may continue to serve well this changing marketing system, they must change and develop in line with the marketing changes. In order to improve these services three lines of work were carried on during the year: (1) To improve the effectiveness of wholesale market news services; (2) to explore the possibilities of developing useful retail market news; and (3) to study the adequacy of grades and standards for farm products.

In cooperation with the Office of the Administrator and the commodity branches, special attention was given to the preparation of a program for the development of the market news service of the Department. This study included an over-all appraisal of the services now being rendered, the features that need strengthening, and the additional services that seem to be needed. The report on this study constitutes a comprehensive plan for the development of the wholesale market news service.

In addition to the work of developing an over-all plan for market news, research was conducted on several problems that affect the present service. One of these was an effort to develop a satisfactory method of reporting prices for butter received by creameries. Changing market practices have resulted in very small quantities of butter being sold by dealers in wholesale quantities in the terminal market. Thus, there is a growing feeling the price quotations in these terminal markets do not provide creameries with a satisfactory basis for judging what prices they should receive. In this study, prices received by representative creameries in Iowa for different grades of butter were obtained and compiled into an experimental market news report which was made available on a trial basis to creameries, farmers, butter dealers, cooperative associations, and others. The usefulness of this kind of service is now being tested, and it is hoped that as a result of work of this kind possible improvements in the market news service will be revealed.

A study was also conducted of terminology used in the various market news reports in an effort to determine the variety of terms used and to reach some conclusions as to how the number of terms used can be reduced and their use by different offices made more uniform. The results of this study have already resulted in the adoption of uniform terms by the livestock market news service in all of its offices.

With the growing use that has been made of the radio in the dissemination of market news information and the wide coverage that is being given to market reports by newspapers and telegraph services, there has developed a need to consider the extent to which daily mimeographed market news reports continue to be necessary. In order to test the need for these reports under present conditions, more than 15,000 users of livestock mimeograph reports were circularized to find out to what extent they are getting market information from other media. On the basis of this survey daily mimeographed reports have been discontinued in a number of offices, and the frequency of their issue has been reduced in others.

In order to test the usefulness of certain phases of the present wholesale market news service, two surveys were conducted in different parts of the country. These surveys provided very useful information on the usefulness of different media of disseminating market information and on the extent to which the present services are meeting the needs.

One of the most interesting research projects conducted by the Branch during the year was one which was set up to explore the possibilities of developing a useful retail market news service. For this study the city of Baltimore was selected, and a careful selection was made of 50 retail stores in the city which would give a representative sample of all the stores in that locality. From these stores retail price and volume information was collected on 125 agricultural food items. An analysis of the results showed that the information obtained from this number of stores was adequate for the preparation of accurate retail price reports but that a larger number of stores would be needed if volume of sales is to be determined by this method.

Copies of the weekly reports compiled in Baltimore are being distributed on an experimental basis, and studies are now being made to determine exactly what use is being made of the reports by the various groups that receive them. On the basis of this study, it will be possible to determine what a retail market news service in a city will cost and of what value it would be. In addition to providing this information about retail market news there have been a number of interesting by-products of this study. It has shown that many stores do not change their retail prices as wholesale prices have changed. It has shown furthermore that a large portion of the retail outlets do not maintain stocks at all times of some of the more common commodities. It has also been found that the retail margins taken do not necessarily have any relationship to cost of handling individual commodities. The evaluation of the uses made of this retail market news report will include consideration of the extent to which such information can contribute to the solution of some of these problems.

Since the frozen food industry is relatively new, a study was conducted to determine its need for market information, and a report was released listing the present market news services for frozen foods and containing suggestions for possible improvements and expansions in frozen food market information.

Uniform standards for trading in nearly all agricultural commodities have become increasingly necessary for the efficient distribution of these commodities. Despite the growing need for inspection and grading services there is considerable difference of opinion regarding the purpose of grading, the kind of grades that are needed, and how they should be applied. For some commodities a number of conflicting grade standards are in force in different parts of the country. Commercial grading is not always in accord with the U. S. grades. This study of the adequacy of grades and standards is being made to improve the standards for the grades now in use and to improve the application of the grade standards in the inspection process. Some of the phases of this work conducted during the year were studies of the basic principles in the development of grade specifications, the coverage and extent of use of U. S. grades, the relation between U. S. grades and commercial grades where

variations exist; the differences between U. S. grades and State grades where differences exist; the need for additional grades; and the best way of presenting U. S. grades and standards. Reports on these various studies were released as the work was completed.

Besides these studies of a cross-commodity nature which the Branch has conducted, it has cooperated in a study of the effects of technological change on agricultural marketing. The marketing structure has undergone material changes within the current generation because of developments in transportation, improved communications, newer forms of retailing, changes in food and buying habits, and new developments in food technology. It is the purpose of this study to catalog some of these technological changes that are taking place and to reveal some of the areas of marketing in which further marketing research is most needed. The report on this study is expected to be ready for publication during the coming fiscal year.

On the pages which follow, the main activities of the Branch during the past year are briefly described. It is hoped that this report will not only serve as a means of cataloging the activities of the Branch for the year but that it will also be of considerable value in bringing about greater coordination between the work being done by this Branch and other students of marketing throughout the country and, in addition, that it will be useful in pointing up some problems of marketing on which additional research is needed.

PLANNING MARKETING FACILITIES IN SPECIFIC LOCALITIES

In many areas throughout the United States the lack of properly organized markets with adequate facilities is depriving farmers of an outlet for their products, lowering their returns on the commodities sold, impeding desirable shifts and adjustments in production, reducing the efficiency of dealers, and increasing the total food bill of consumers.

The largest quantities of food brought together in one place are in the Nation's terminal markets. The more important markets usually receive supplies from nearly all the 48 States, and it is there that prices of farm and food products are established. That these markets function properly is therefore highly important. In many of these large markets facilities are not efficient, generally being antiquated and overcrowded. Frequently, instead of having a unified market where a complete line of products can be obtained, one type of commodity is handled in one part of the city, and another type is handled in another part. This leads to much cross-hauling and other expense. Sometimes supplies arriving by one railroad are sold in one market district, supplies arriving by another railroad, in another district. Usually rail receipts cannot be delivered directly into wholesalers' warehouses because the railroads stop short of the market district thus penalizing the railroads and adding unnecessary costs. Traffic congestion is commonplace. Many trucks bringing supplies to the market district or going there to haul them away cannot get near buildings for loading or unloading, and considerable portorage is necessary. Often the store buildings are not large enough to accommodate the commodities which should move through them, and they lack the refrigeration and facilities necessary to handle and protect the commodities properly. These are a few of the defects of the Nation's terminal markets which will have to be corrected before it can have a truly efficient marketing system.

Concentration or assembly markets are markets where the products of the farm, ranch, or grove are concentrated in marketable volumes. They may be in rural areas or in cities. When such markets are located in a rural area, they are usually in an area of commercial production. In this case, the markets are sometimes referred to as shipping point markets, and practically all receipts are shipped out either by rail or by motortruck to more distant markets. When they are in cities, concentration markets may also provide a source of supply for local consumers, thus performing the functions of a terminal market. However, the majority of the receipts on city concentration markets are shipped out to more distant markets. City concentration markets may be either in areas of commercial production or along trunk rail and highway lines between the more important areas of commercial production and the relatively heavy consuming centers. Where the latter is the case, they are sometimes referred to as exchange or redistribution markets. In addition to providing facilities for assembling, displaying, selling, and loading out farm and food products, a relatively large number of concentration markets provide facilities, and in some cases equipment, for washing, grading, sizing, packing, and icing these commodities.

Secondary or jobbing markets are the markets where the principal sources of receipts are nearby terminal markets. In this kind of market, receipts arriving

directly from the areas of production are relatively small. Secondary markets may be either in the larger cities that have one or more terminal markets or in the smaller cities. Secondary markets in larger cities are usually patronized by buyers who prefer, because of the time required to visit the terminal markets and because of existing regulations thereon, not to patronize the latter kind of market. In the smaller cities where secondary markets are found, the volumes handled are usually insufficient to warrant full carlot receipts. There are indications that secondary or jobbing markets may become less important in the marketing system for perishable commodities than they are today because of: (1) The continued expansion of motor-truck transportation of perishables which makes it feasible for dealers to receive less-than-carload lots directly from the areas of production and terminal markets and to distribute these commodities over a wider area than was previously possible; (2) the moving of terminal markets to more convenient locations and the improvement of facilities including provisions for streets of adequate width; (3) the growth of service-wholesaling and the consequent bypassing of secondary markets by such firms and chain stores; and (4) the impetus provided through competition for eliminating or minimizing handling costs such as cartage from terminal to secondary markets.

In a number of places the problem stems out of the fact that there are too many markets rather than from a complete absence of them. In these localities duplicating services and facilities increase marketing costs, scatter or fail to attract the buyer with a resultant lack of competition and/or demand, cause unnecessary travel on the part of farmers and buyers who go from market to market, and result in much waste of labor and deterioration of products. The benefits from the development of proper organization and facilities in the localities where markets are needed would accrue not only to farmers and consumers, but also to the trade which has a vital interest in better facilities, where it can operate more efficiently and where there are possibilities of expanding the volume handled.

One of the functions of the Branch is to develop plans and promote the construction of proper kinds of marketing facilities for all kinds of farm and food products in terminal and secondary markets, in producing areas, and at other points in the marketing channel. Insofar as possible work in the specific localities is carried on in cooperation with some appropriate State agency, such as the State department of agriculture, the agricultural experiment station, or the extension service.

During the past year work was done in planning and promoting the necessary facilities in 24 cities and producing areas located in 16 States and Puerto Rico. In the conduct of these studies, facilities for handling fruits, vegetables, poultry, eggs, butter, meat, frozen foods, and other commodities are analyzed to determine the defects in handling methods and of the facilities being used and to measure the amount that is added to the marketing costs because of each defect. The kind, size, and amount of facilities needed to handle the products efficiently are determined; the availability and cost of satisfactory sites for the facilities are ascertained; and definite plans are drawn up for the kind of facility that would best meet present requirements and make proper provision for future expansion to meet the growing needs of the area concerned. Reports prepared on each study present all of this information and show the exact kinds and size of facilities needed; the best

location for such facilities; what they would cost; how they should be managed and operated; what rentals would have to be charged for their use; how they could be financed; what savings would result from operating in them as compared with operating in existing facilities; and what benefits would accrue to the farmer, distributor, consumer, and the locality from carrying out the recommended plans. New facilities are not recommended unless the construction would either reduce the cost of handling the products concerned, or expand the outlets for farm products, or both.

The report on the study in each instance is first presented orally to all the interested groups in the locality and the surrounding area in order to get their suggestions and criticisms. At this presentation the facilities proposed are demonstrated by use of scale models. Following this presentation, a written report is prepared and released, after which work continues with the interested groups in helping them draw up the necessary organization to build and operate the facilities, select the location, arrange the financing, and redraw the actual lay-out to fit the site purchased. After the local architects and builders have been selected, the persons responsible for the study work with them for two or three days to see that they fully understand not only the kind of facility needed, but also the reasons for drawing the plans in the way that they were drawn. At that point the local architects and builders take over and construct the facilities. When construction has been completed, further assistance is given to the people operating in the facilities by helping them plan for the successful operation and determine the kinds of market regulations needed, and in the handling of other subjects that are necessary to help the new facility succeed.

Projects completed in previous years have culminated in the construction of new markets in 6 localities and improvements in 3. In 8 other localities construction either has started or is about to begin. As additions may be made to these markets in future years or as problems may arise in connection with facilities or market organization, Branch personnel, on request, will attempt to provide the assistance needed in the completion of the market improvement programs. In some places, such as Baton Rouge, La., where studies have been made and reports published during a previous year, no promotional work has been undertaken during the past year. However, the projects are not considered as having been completed, and Branch personnel will work with local groups at the appropriate time in promoting the construction of the facilities recommended. In other places, such as Leesburg and Melbourne, Fla., where studies have been made, it was recommended that markets not be constructed. These projects are therefore considered as having been completed.

The status of the work at the end of the year in each of the 24 localities in which work was done during the past year is briefly described in this section.

WORK DONE IN DEVELOPING MARKETS PREVIOUSLY RECOMMENDED

Baltimore, Md.

At the request of the market committee appointed by the Maryland State Planning Commission, a partial survey of the needs for a wholesale market facility in

Baltimore was carried out in 1948. Based upon the findings of this survey, a bill was presented in the Maryland State Legislature in 1949 for the creation of a market authority that would be able to carry out a market development in Baltimore. Although a large part of the trade interests in Baltimore are interested in new market facilities, the Maryland State Legislature has not passed such legislation.

Because of the need for additional work in connection with the study and the inability of the Branch to find time to do such work, the report has not been published. Also, the lack of enabling legislation for the building of the kind of market needed in Baltimore has retarded the completion of the report.

Cleveland, Ohio

A report of a study made of the retail market facility needs in order to replace an old retail market (Central Market) in the city of Cleveland was given to officials of Cleveland in 1948. At that time additional information was needed with respect to the leasing by the city of a parking area that would need to be developed in connection with the market building. At a meeting in January 1949, it was found that it would not be possible for the city to lease such space to a private operator at the necessary rental required to cover the cost of the facility. Further consideration was given to the development with the city officials, but no final determination was made. On December 25, 1949, the Central Market building, which was to be replaced by the proposed new retail market, burned to the ground. The operators in that market have made temporary arrangements to lease space in an existing cold storage warehouse within a block of the location of the Central Market building and immediately adjacent to the area considered for the development of a new central market. The final report of this study is in the process of being written, and will take into consideration these recent developments.

Columbia, S. C.

A study of the city's produce market, requested by the Mayor and City Council of Columbia, was completed, the conclusions and recommendations discussed with all interested parties, and a report consisting of 120 pages released in January 1949. The market recommended consists of 34 wholesale stores, 120 stalls for farmers and truckers with additional parking space for 450 motor vehicles, rail connections, etc. The cost of constructing the facilities recommended was estimated at \$573,000, excluding the cost of land. The annual savings in handling costs in the new facility were estimated at \$382,000. This project has now been taken over by the South Carolina State Marketing Commission which has available for construction of a new market \$200,000 of State funds and \$100,000 of city and county funds, or a total of \$300,000. The remaining funds needed will be obtained through the issuance of revenue bonds. A site near the State Fair Grounds consisting of 50 acres of land has been acquired and an engineering firm employed to develop detailed plans and specifications for the facilities. Contracts covering some of the work necessary to place the site in condition to build have been let and this work is now underway. Because of the continued growth of the Columbia market, State officials have found it necessary to increase the amount of facilities to be constructed initially above that recommended, and it is expected that the total cost of the facility, including land, will

approximate \$800,000. Branch representatives have worked closely with the site and finance committees and with the engineers.

Columbus, Ohio

In February 1948, the report, containing 127 pages, of the survey of market facility needs in Columbus for handling produce at wholesale was released by the Branch in cooperation with the College of Agriculture of the Ohio State University. Although the market interests in Columbus are in agreement that the existing wholesale market is inadequate and a new one is needed as recommended in the report, the problem of what to do with the land and buildings in the present market has not been solved. Several committees have been working on the solution of this problem for the past two years. Representatives of the Branch are working closely with officials of the Franklin County Planning Commission and with city and other agencies in order to assist them in the carrying out of the project. Although several of the sites studied in the report have since been used for other purposes, there remains a site which might be used for the market development. However, some further study will need to be given to this site before determining its desirability as a new market location.

Dallas, Tex.

Representatives of the Branch have worked with city officials, trade groups, and others in Dallas for a number of years for the development of improved wholesale market facilities to serve that area. After discussions and work done in Dallas in 1941, one farmers and truckers' shed was built in 1942, a second shed in 1945, a 16 unit wholesale building in 1947, and 12 more units in 1949. Plans are underway for about 10 additional units to be built in the coming year.

When the foregoing developments are complete, expansion of the market will be dependent upon a slum clearance project in the area adjacent to the facilities already built. The city has procured a large part of the area, and plans to hold it for future use.

Greenville, S. C.

The preliminary report, based on a study of Greenville's wholesale market system for fruits, vegetables, poultry, and eggs, was presented in August 1948 to the local groups requesting the study. Recommendations were made for a new market to consist initially of one store building with five units for wholesale produce dealers and one shed with 20 stalls for farmers and truckers. The final report, consisting of 46 pages, was completed and released in June 1949. The new market, consisting of the facilities recommended, was opened for business on June 1, 1949, by the Greenville County Market Commission. Since it was opened, the volume of business has made it necessary for the size of the facility to be virtually doubled. During this fiscal year, four new store units for produce dealers, a poultry dressing plant, and a sweetpotato curing and storage house have been constructed and are now in operation. Branch representatives have continued to work with the Market Commission in connection with its expansion program.

Hartford, Conn.

A report of 121 pages of the survey of the needs for market facilities in Hartford, Conn., was published in January 1948. The plans provided for a new and relocated wholesale market for the handling of all kinds of perishable foods. During the past year, the staff worked with members of the Connecticut State Market Authority in the arrangements for land acquisition and for buildings to be constructed on the site. Arrangements for financing have been completed, and the city has notified dealers using city-owned facilities that they will need to move by March 31, 1951. The proposed site has been filled and drainage provided. It is anticipated the facility will be constructed during the coming year.

Houston, Tex.

In June 1948, the report, containing 123 pages, of the survey of market facility needs in Houston, Tex., for handling produce at wholesale was released by the Branch. Immediately after the release of this report, a nonprofit private corporation was developed. Although a very large majority of the wholesale trade is seriously interested in the development, no feasible method of financing has been developed. This Branch has consulted with officials of the nonprofit private corporation and is working with them to further the advancement of a good wholesale produce market in Houston.

Little Rock, Ark.

In January 1948, a study of the wholesale produce markets in Greater Little Rock was inaugurated in cooperation with the University of Arkansas and the State Resources and Development Board, at the request of the Arkansas Economic Council and Little Rock Chamber of Commerce. The estimated cost of constructing the facilities needed now approximates \$530,000, excluding land. Such a market properly located should bring about annual savings in handling costs of roughly \$175,000. A report consisting of 64 pages was issued in June 1949. Interested groups in Little Rock are currently investigating the possibilities of financing such a project. Enabling legislation authorizing the creation of public benefit corporations for market purposes has been enacted and this type of ownership is receiving consideration.

New Haven, Conn.

A report on the wholesale produce market of New Haven, published in December 1946, recommended that a new market be built on a 37-acre tract known as Boulevard Playground site. This site was later procured for park and playground development.

During 1948, New Haven Harbor was dredged. Part of the harbor adjacent to the wharf area was filled in, and a new super highway developed over part of the fill. About 200 acres of land were made available between the highway and the existing perishable railroad yards and related facilities. During the past year, a market committee was organized with the assistance of the New Haven Chamber of Commerce to find out what might be done toward a new market development on this land. This committee solicited the assistance of the Connecticut State Market Authority. At the request of the Authority a representative of the Branch met with the committee and a representative of the Authority in February 1950, and the committee voted unanimously that the Authority be requested to ask the Branch to prepare a supplement to the December 1946 report covering the possibilities of a market development on the site made by filling in New Haven Harbor. This supplement will be released in August.

Richmond, Va.

In March 1948, the report, containing 91 pages, of a survey of the market facility needs in Richmond, Va., for handling produce at wholesale, was released by the Branch in cooperation with the Virginia Agriculture Extension Service, Department of Agricultural Economics. Although difficulties were encountered in the acquisition of the site and in financing the development, it appears that the development will be carried out in the very near future. Representatives of Richmond, having to do with the development of plans for building and financing the market, have consulted with representatives of the Branch in these developments.

San Antonio, Tex.

At the request of the Chamber of Commerce, a study has been made of the wholesale market facilities in San Antonio for fruits, vegetables, poultry, eggs, and meats, and the conclusions and recommendations discussed with all interested groups. Although the final report will not be released until late in 1950, it was recommended that 80 acres of land be acquired for new market facilities, one-half for immediate use and the remainder for expansion. Facilities recommended for initial construction consist of 60 wholesale houses with main floor and basement; 300 stalls under sheds for farmers and truckers; a shed for grading, packing, and icing; team tracks; and offices. The total cost of the proposed market, including land, would approximate two million dollars. The estimated annual savings in handling costs would approximate \$400,000. A nonprofit private corporation has been formed to finance and operate the market, and its officials have already obtained an option on a site. Branch representatives have continued to work with local groups particularly with respect to financial arrangements. It is expected that funds will be obtained through local investment bankers.

St. Louis, Mo.

In June 1949, the report, containing 155 pages, of the survey of market facility needs in St. Louis for handling produce at wholesale was published in cooperation with the State Department of Agriculture of Missouri. The report recommended that a market containing about 288 wholesale store units, farmers and truckers' sheds, and related facilities be built in a new location at a cost of about \$4,000,000. It was estimated that by building the market an annual saving of about \$1,000,000 could be made. In accordance with its recommendations the various trade groups formulated a nonprofit private corporation that arranged for financing, building, and managing the market. Construction of the market was delayed because of the necessity of closing several streets to be included in the market area and making certain other arrangements. Most recent information on the proposed market development is that it is now under construction and will be completed in 1951.

STUDIES CONDUCTED DURING THE YEAR TO DEVELOP MARKET FACILITIES

Arizona

The first phase of a study, begun in 1948, designed to show the relation between locker plants and home freezers in the distribution of frozen foods in

Arizona, was completed for publication in June 1950. The Branch made this study at the request of the frozen food industry in Arizona to learn how frozen food locker plant facilities and services can be used most advantageously to expand and improve the distribution of frozen foods. The Branch's participation in this project is due to the growing importance of frozen food locker plant facilities and services in the marketing of frozen foods.

The report, containing 58 pages, includes descriptions and analyses of methods and facilities used in Arizona's 34 locker plants, and points out where improvements in the arrangement of facilities and equipment could do much to increase the efficiency of locker plants. Other common faults found were the use of poor packaging materials and improper wrapping techniques, lack of sufficient cold storage space, and poor or no merchandizing programs.

This report also covers a survey of a representative number of home freezer owners in Phoenix and the Salt River Valley area to show the extent to which these home units are now being used and the degree to which the owners depend upon services and facilities offered by the locker plant. The effect of variations in the family and home conditions on the purchase and renting of frozen food storage facilities, both at the locker plant and at home, is described and analyzed. Economy and convenience were by far the most important reasons given by families for buying a freezer. The importance of economical sources of supplies was evident among families who appeared to be making very good use of their units.

The study revealed that families who purchase freezers do not necessarily become independent of locker plant storage and processing services. Altogether, about three-fourths of the freezer owners patronize locker plants for one or more reasons, such as renting locker space, using various processing services, buying meat, frozen foods, and packaging materials.

Field work has been completed in a second phase of the study in which records of current operations were kept by families with home freezers and also by locker plant operators who provide these families with supplies and services. Also, records were maintained on power consumption of several home freezer cabinets under actual operating conditions. This phase was started in March 1949 and was carried on over a period of approximately one year. The data obtained are now being analyzed, and soon a report will be written on the findings.

The third phase, which has been conducted by the Branch in cooperation with the University of Arizona, is now nearing completion. This phase consists of comparisons between regular day-to-day purchasing at retail stores and buying certain food supplies in quantity at near wholesale prices from locker plant and using freezer storage space both in the home and at the locker plant. Results from these experiments will be supplemented with data obtained from records being kept by families in the Phoenix area.

Boston, Mass.

The report, containing 148 pages, of a survey of the market facility needs in Boston, Mass., for handling produce at wholesale was sent to the processing room in

June 1950. It was recommended that 461 store units be built for wholesale dealers in fruits, vegetables, poultry, eggs, meat, fish, dairy products, and related products; an auction building; sheds for 80 farmers and truckers; team and house tracks; and various related facilities, on 170 acres at a cost of about \$13,800,000. (See fig. 1.) It was estimated that an annual saving of about \$4,000,000 would be realized by the building of the market. In accordance with recommendations made in the report, the various trade groups, Commonwealth of Massachusetts, officials of the city, and other groups are working for the creation of a Boston Market Authority. A bill has been introduced in the Massachusetts Commonwealth Legislature entitled, "Act Establishing the Massachusetts Market Authority and Defining its Powers and Duties." However, should this legislation not materialize, a nonprofit private corporation might be created to carry out the provisions of the report. Representatives of the Branch are working with the interests of Boston to carry out the proposed market development.

Huntington, W. Va.

During the past year a survey looking toward the improvement of the wholesale produce market at Huntington, W. Va., was begun by the Branch in cooperation with the Department of Agricultural Economics, University of West Virginia. The request for this study was made by the local chamber of commerce, officials of the city, and trade groups. The field work has been completed, and a preliminary report was presented orally to the local people in June 1950.

Indianapolis, Ind.

In June 1950, the report, consisting of 91 pages, of a survey of the market facility needs of Indianapolis, Ind., for handling produce at wholesale was published. The report recommended the building of 106 store units for wholesale dealers in fruits, vegetables, poultry, eggs, meat, fish, dairy products, and dry groceries; sheds for 180 farmers and truckers; team and house tracks; and related facilities at a total cost of about \$2,400,000. It was estimated that by building the market annual savings of \$784,000 would be realized. In accordance with the recommendations of the report the various trade groups have formed a nonprofit private corporation and procured 75 acres of land. They are now in the process of arranging for the financing and building of the market. Construction of the market should be underway within the next three or four months. Branch staff members are consulting with officials of the corporation in these developments.

Louisville, Ky.

At the request of the Louisville Area Development Committee, and in cooperation with the Kentucky Agricultural Experiment Station, a study of the needs for wholesale fruit, vegetable, poultry, and egg marketing facilities was inaugurated in that city during August 1949. During the week of April 24, 1950, the preliminary report, which included the results of the survey and recommendations for market improvements, was presented to the representatives of the Louisville Chamber of Commerce (successor of the Louisville Area Development Committee), railroad officials, wholesale dealers, retail grocers and farmers. The report recommends a new, modern market for

Louisville on the basis that there will be only one wholesale market in the metropolitan area.

A modern market with efficient facilities for handling about 7,270 equivalent carloads--the volume of business which it was estimated would move through a new market, based on the 1948 volume--would require about 30 acres of land and would cost about \$1,068,300, including cost of land.

To meet facility requirements, the following would be needed: 44 store units for wholesale dealers, a truckers' shed with 50 stalls, farmers' sheds with a total of 100 stalls, an administration building, double rail connections to store building, a 20-ton platform scale, fence, and other related facilities. The estimated savings in marketing costs would amount to \$320,000 annually.

The final report has been completed and will be published about September 1950.

Milwaukee, Wis.

In January 1950, the report, consisting of 101 pages, of a survey of the marketing facility needs in Milwaukee, Wis., for handling produce at wholesale, was released by the Branch in cooperation with the College of Agriculture of the University of Wisconsin. The report recommended the building of 77 store units for wholesale dealers handling fruits, vegetables, poultry, eggs, meat, dairy products, and dry groceries; sheds for 80 farmers and truckers; house and team tracks; and related facilities, at a cost of about \$2,500,000. It was estimated that annual savings of about \$400,000 would be realized by the building of the market. Although the State of Wisconsin has a Market Authority Act permitting the creation of a market authority for the city of Milwaukee, action on the application of the trade and local interests of the city of Milwaukee has not been favorable. A study of the situation is being made by the Governor at the present time. Representatives of the Branch are continuing to work with the State and local groups in order to aid them in the development of a good wholesale produce market in Milwaukee.

Norfolk, Va.

In June 1950, the report, consisting of 64 pages, of the study of market facility needs in Norfolk, Va., for handling produce at wholesale was sent to the processing room. The report recommends the building of 28 wholesale store units, shed space for 30 farmers and truckers which would also be used for a farmers' auction, office space, trackage, streets, and other services, at a cost of about \$700,000. It was estimated that annual savings of about \$50,000 could be realized by building the market, after allowing for amortization of the investment and operating costs. In accordance with recommendations, the various trade interests formed a non-profit private corporation, have arranged for procurement of the site, and plan to begin building facilities in the very near future. Branch staff members are consulting with officials of the corporation in these developments.

Raleigh, N. C.

Meetings with the City Council and with interested farm and trade groups were held in Raleigh on March 7 and 8, 1949, for presentation of a summary of a preliminary report based on the study of the produce market in that city. This study was made in cooperation with the State Department of Agriculture and the State Agricultural Experiment Station in response to a request from the City Council. A report consisting of 68 pages was issued in June 1950. The cost of the new market recommended for Raleigh, including cost of the land for a market site, would

approximate \$220,000. Savings in handling costs would amount to roughly \$50,000 annually.

At the end of the year local groups had under consideration different methods of financing a new market. Branch personnel have continued to work with these groups in promoting construction of the recommended facility.

San Juan, Puerto Rico

At the request of the Insular Department of Agriculture and Commerce and other agencies of Puerto Rico, the Branch began during the past year, a study of the market facility and distributive problems of Puerto Rico. Because of many unknown factors with respect to these problems it was necessary for representatives of the Branch to spend considerable time on the Island to find out what the existing facilities are, production and volume of movements including imports, and many other problems not common to the rest of the United States. As a result of the preliminary survey, it was found that the facilities in the metropolitan area of San Juan were more important in the receipt and distribution of produce than any others in Puerto Rico. Therefore, it was decided to make a complete survey of the market facilities and distributive system of the San Juan area, and the preliminary field work in this connection has been completed. The Branch is summarizing data acquired in this survey and developing a plan for new market facilities for that area. With respect to the remainder of the island, certain production, processing, and other problems are involved which will require the participation of agencies other than this Branch to determine what actually will be needed on the Island. The final report covering the market facilities recommended for metropolitan San Juan will be published in the coming year.

Savannah, Ga.

A study of the Savannah markets for perishable produce, which was undertaken in response to requests from the Mayor and City Council and the Chatham County Farm Bureau, in cooperation with the Georgia Agricultural Extension Service and Experiment Station was completed, and the report consisting of 66 pages was released in February 1950. The total cost of the new market recommended in that city would approximate \$180,000. Savings in handling costs would average around \$67,000 annually. To finance, construct, and operate the new market, farmers in a 10-county area around Savannah and the wholesale produce trade in that city are working toward the organization of a nonprofit private corporation. Articles of association have been drafted, and a charter will be applied for as soon as agreement has been reached on several points concerned with management.

Tulsa, Okla.

Field work on a study of the Tulsa produce markets was tentatively completed on March 15, 1949, in cooperation with the State Board of Agriculture, and a report consisting of 78 pages was released in March 1950. This study was made in response to a request from the Tulsa Chamber of Commerce. The report recommends the reorganization and development of the present Trenton Avenue Market as Tulsa's central

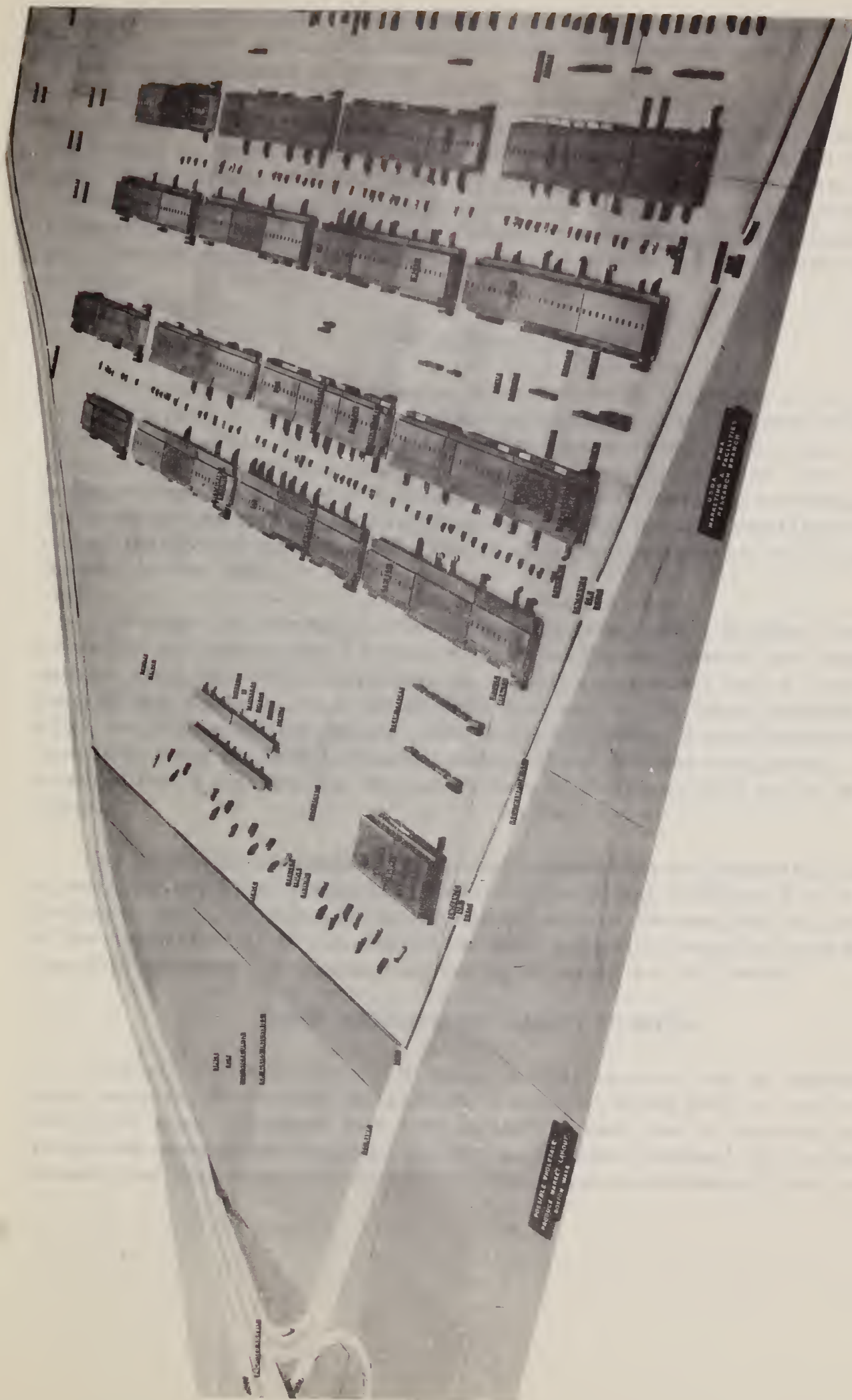


Figure 1.--Possible market lay-out, by use of scale models, Boston, Mass.

wholesale produce market. The estimated cost of such a program was approximately \$650,000. Annual savings in handling costs that might be made in an improved facility were estimated at \$94,000.

The Tulsa Chamber of Commerce has assigned to its agricultural representative the task of following through with the recommendations. The agricultural representative and the agricultural committee of the Chamber of Commerce have given the report special study and entered into negotiations with the operator of the present market in an attempt to acquire the market. However, the death of the operator has brought all negotiations to a standstill pending the outcome of litigation concerning ownership.

Tyler-Jacksonville, Tex.

A study of the produce marketing system of the Tyler-Jacksonville, Tex., area was inaugurated in June 1948 in response to a request from the Heart of East Texas Agricultural Council. Most of the data needed were collected during that month, but additional field work was undertaken in February 1949. At that time a progress report was made to the Council. A preliminary report containing recommendations on the types and amounts of facilities needed at Tyler and Jacksonville was made to interested groups in March 1950. The final report, consisting of 70 pages, was released in June 1950.

The market recommended for Tyler consists of a produce building containing 5 units for produce dealers, a shed with 10 stalls for farmers and truckers, an auction block and office building. It is also recommended that a large area be reserved for expansion, as it is expected that most of the tomato shippers in Tyler will eventually establish packing sheds at the new market. A site containing approximately 16 acres has been purchased, grading of the land has been started, and it is expected that a contract for the construction of facilities will be let in the near future.

The facilities recommended for initial construction in Jacksonville consist of a paved selling area, two packing sheds, and an office building. A site has been purchased, and it is expected that a contract will be let soon for the construction of the facilities. It is the plan of the local groups interested to have the market completed and opened for business at the beginning of the 1951 season.

OTHER REQUESTS FOR MARKET STUDIES

Requests for assistance in planning markets in more than 30 localities have been received. Because of the necessity for continuing work in some of the 24 localities where assistance was given during the past year in order to aid efforts to get the construction completed and the insufficient personnel for the work, it is contemplated that only about 10 of these requests can be met during fiscal year 1951.

DETERMINING PRINCIPLES FOR PLANNING MARKETING FACILITIES

The sound planning of market facilities in specific localities is dependent upon an adequate fund of basic data and on "tried and true" principles that can be applied to all situations or that can be adapted to meet specific situations. Moreover, the availability of adequate research data and the development of standards or criteria should materially reduce the time required on the part of Branch personnel in making studies of existing markets in specific localities to provide a basis for sound improvement plans.

During the past year work has been continued or inaugurated on six studies or lines of work, all of which have as their purpose the determination of principles to be followed in planning market facilities. A brief report on each study follows.

FACTORS THAT GOVERN THE SUCCESS OF WHOLESALE MARKETS FOR FARM PRODUCTS

This study was undertaken to determine the factors which govern the success of markets for various types of farm and food products. As the interest in market facilities has grown over the years, many market facilities built in producing areas have, for a number of reasons, failed. Others, of course, have succeeded. In order to prevent the loss in capital expenditures as well as the loss in price to growers that results from having too many markets with too small a volume, this study is being made to try to find out just what conditions are necessary in order to make reasonably certain that a concentration market, if built, will succeed. Data developed through this study will provide criteria which the Branch can use in its work in determining where markets are needed and in planning facilities of the right kind and of the right amount in those places. It will also aid in preventing the waste of funds by various groups in producing areas in building facilities that are doomed to failure before they are constructed.

Field work was begun on one phase of the study in February 1949. This phase is limited to the shipping point markets for fruits and vegetables and is being conducted in cooperation with the Cooperative Research and Services Division, Farm Credit Administration.

Field work on this phase of the study has been completed, and an analysis of the data and records obtained from approximately 100 markets located at various points through the United States has been started. It is contemplated that the analysis will be completed and the final report released before the end of fiscal year 1951.

One of the outstanding observations made at the assembly markets studied is that many of the successful markets were subsidized for periods of one to five years before they became self-supporting enterprises. Other observations are: (1) The large extent to which these markets provide a cash market in the production areas in which they are located; (2) the tendency for truck shipments to move directly from these markets to consuming centers; (3) the tendency for many of these markets to

specialize in only one or two commodities; and (4) the interrelationship of several factors such as management, volume of sales, and number of buyers on the success of the market.

FACTORS THAT GOVERN THE SUCCESS OF COUNTRY ELEVATORS

In response to requests received from agricultural institutions, independent line elevator organizations, railroad and other industrial and farmer groups, including farmer cooperatives, preparations were made during the latter part of 1949 for an over-all study of country elevator facilities. The study is being done in cooperation with the Fats and Oils Branch, to the extent that the study is related to the storage of oil seeds.

The objectives of this study are to determine what location, construction, design, size, equipment, and method of operation are most efficient for a country elevator, and how much the facilities will cost and how then can be financed.

The study was initiated on a pilot basis, covering 18 selected elevators of from 5,000- to 100,000-bushel capacity in the State of Indiana. The type of agricultural economy in the adjacent service area also was used as a factor in the selection of sample units for study. Most of the field data were collected at country elevator units during January, February, March, and April of 1950.

Summarization of the data obtained on the 18 elevators included in the pilot study was completed by the end of the fiscal year. The data on these elevators will be analyzed and a report published in 1951. After analysis of the data obtained in the pilot study, it may be necessary to expand the study to cover additional units under varied conditions in several States in addition to Indiana.

POULTRY AND EGG MARKETING FACILITIES IN 30 CITIES

Work was completed on a study of wholesale poultry and egg markets in 30 cities and a report sent to the processing room in June 1950. The 30 cities included in the study were selected on a geographical basis and have wholesale poultry and egg markets which are representative of the facilities used in distributing poultry products throughout the United States. The purpose of the study was to set forth the conditions commonly found in wholesale markets for poultry and eggs, and to show some of the principles that should be followed in improving facilities used for the physical handling of these products. The organization of markets, the functions and types of wholesalers, facilities, materials handling and processing equipment, rules and regulations affecting poultry and egg markets, and unethical practices all were given consideration in the study.

The defects in the markets were given special attention with a view toward a practical solution for improvement. Present poultry and egg wholesale stores frequently are poorly designed and unsanitary and lack unloading platforms, processing rooms, refrigeration and rail connections. The market streets are generally

narrow, poorly paved, and congested with traffic. These shortcomings result in long delays and excessive handling of highly perishable poultry products. This, in turn, is reflected in increased handling costs because of added portorage, extra cartage, and increased breakage and deterioration. The strong demand for wholesale stores in market areas also results in excessive rental costs for inadequate facilities.

The wide variations in the poultry and egg marketing facilities in the 30 cities require intensive local research prior to the development of recommendations for improvements. It is recommended that any improvement program should include research to determine current needs and provide a basis for the development of plans in individual cities and markets. Fundamental research in marketing facilities and materials handling is also needed to develop principles or standards basic to planning markets. The promotion of plans for the facilities needed by various produce interests in each city is also a vital requirement if improved facilities are to be provided. Finally, management training and guidance to insure the efficient operation of the new facilities are requisites to market improvement programs.

AMOUNT OF FLOOR SPACE NEEDED IN PRODUCE STORES TO HANDLE SPECIFIED VOLUMES OF COMMODITIES

In developing plans and making recommendations for terminal, secondary, and concentration market facilities for produce in specific localities, it is necessary to include information showing the size and number of store units that should be built at the time of initial construction in order to provide adequate platform and floor space for handling efficiently the anticipated volume of farm products. Little or no reliable data now exist upon which to rely in estimating the needs for store space. The only way that such an estimate can be made is on the basis of the total space currently used by dealers handling the farm products, from which adjustments are made. Also weighed is the fact that in an efficiently arranged facility a greater volume of merchandise can be handled within a given unit of floor space. Work was continued during the year on the study of space needs of wholesale dealers in fruits, vegetables, poultry, and eggs. The objective of this pilot study is to determine the factors that can be measured empirically in making space recommendations for terminal, secondary, and concentration market facilities.

On the fruit and vegetable dealers' phase of the work, a preliminary report for use by employees of the Branch was prepared. This 22-page report is entitled, "Space Used for Fresh Fruit and Vegetable Stores on Four Modern Produce Markets."

On the poultry and egg dealers' phase, several changes have been made. During the year data for an additional 153 dealers in 10 cities were added to the original group, bringing the total sample under study to 249 dealers in 16 cities. A 21-page preliminary report was prepared entitled, "An Analysis of Floor Space Used by 249 Poultry and Egg Dealers in 16 Cities." However, sufficient additional work has been done to justify a revision and broadening of this first draft. At present, a second draft is being prepared entitled, "An Analysis of Volumes Handled, Floor Space, and Rents for 249 Independent Poultry and Egg Dealers in 16 Cities." This draft will be approximately 40 to 50 pages in length. Further work is planned on this pilot study for fruit, vegetable, poultry, and egg dealers as time permits.

DESIGN OF A WHOLESALE FROZEN FOOD PLANT LAY-OUT

During the past year this Branch initiated a study to determine the most important factors to be considered in designing a frozen food wholesaler's plant lay-out. In attempting to reduce costs of marketing frozen foods, consideration must be given to the possibilities of attaining more efficiency through establishing and using better designed wholesale plants. Many wholesalers today are operating on margins as high as 20 to 25 percent when, with certain changes in plant design and with better use of equipment and personnel, this margin could be reduced to as low as 8 percent. In some instances wholesalers could improve their operations with relatively minor changes in plant lay-out; others would have to make substantial plant alterations; while still others could obtain an increase in efficiency only by building entirely new facilities. Figure 2 shows a design for a wholesale frozen food plant that has been developed under this study.

Because of this need for more efficient wholesalers' plants, the National Association of Wholesale Frozen Food Distributors requested a detailed study of the facilities for handling of frozen foods and several wholesalers offered their plants to us as "laboratories" for such a study. In selecting a sample of firms for study, consideration was given to the geographic location, size of business, and methods of receiving and delivering merchandise. Plants are being included which have private warehouses and also those which depend upon public storage.

Analyses will be made of the amount and methods of receipts into the city, as they relate to plant facilities. Wholesalers using various methods and having various types of facilities for order-assembling, -holding, and -loading will be included in the study. A final report will be prepared describing and analyzing the methods and facilities now being used, and it is expected that a model plant lay-out designed to cut costs of handling will be developed.

METHODS AND FACILITIES USED IN HANDLING FROZEN FOODS

To find out the kind of facilities being used for the handling of frozen foods and to discover some of the inadequacies of such facilities, and what types of facilities and methods of handling seem to be most efficient, the Branch made a study of the frozen-food industry, with consideration of each step through the marketing channel. A report on the findings of this study was released in June 1949.

There has been an unusual demand for copies of this report, and a great deal of favorable comment on its usefulness, from all segments of the frozen food industry and also from many related industries. As a result, it was necessary to have a second reproduction of the publication. Several colleges have requested the report to use in their marketing courses. One of our largest cities is using it in training classes for food specialists. Practically all of the leading trade journals have printed sections of the report.

MATERIALS-HANDLING EQUIPMENT AND METHODS

For a number of years the Department of Agriculture, through various programs, has emphasized the importance of efficiently designed marketing facilities for farm and food products in bringing about reductions in handling and other marketing costs. However, it was not until two years ago that work could be inaugurated by the Branch looking toward the more efficient selection and use of modern materials-handling equipment by the handlers of these products at the various stages in the marketing channel. The first study in this field on which work was inaugurated covered unloading, transporting, and stacking operations of various package types in the stores or warehouses of distributors, eight package types of fruits and vegetables being studied first. The second covers the handling of bales of cotton in public warehouses.

The specific objectives of the work currently underway are to determine the comparative efficiency of different types, or combinations of types, of materials-handling equipment for the physical handling of packages of fruits and vegetables in the stores or warehouses of wholesalers and bales of cotton in public warehouses, to determine the amounts of equipment needed for the most efficient handling of specific work loads, and to develop improved methods of using materials-handling equipment for performing specific operations. As work is completed on these package types, the handling of other types of packages of these and other commodities will be considered. The results of the first studies will simplify the work to follow because of the similarity of handling problems.

FRUITS AND VEGETABLES

Handling costs associated with the distribution of fresh fruits and vegetables make up a large part of the total food marketing bill. These costs are reflected in the prices consumers pay as well as those received by the successive elements of the distributive system and ultimately the farmer. The inefficient facilities used for marketing the products provide an environment in which poor handling methods seem normal. Introduction of proper materials-handling equipment and installation of correct methods of using this equipment seem necessary if costs are to be reduced. A study is being conducted, which has as its ultimate objective, the determination of what kinds of equipment, used alone or in combination with other equipment, will bring about the greatest reduction in handling costs for differing volumes and each package type under each situation and type of facility where commodities are moved or handled.

For the purpose of the study, the materials handling job in fruit and vegetable stores and warehouses has been broken down into three major operations: (1) Unloading from transportation equipment and placing in storage; (2) intraplant movement; and (3) moving out of storage and loading out. Initial work on the project was limited to the first of these operations with the idea of completing this part of the study, thus making a partial answer available to the industry in a much shorter time than would be required if all three operations were studied concurrently, before inaugurating work on the other two operations.

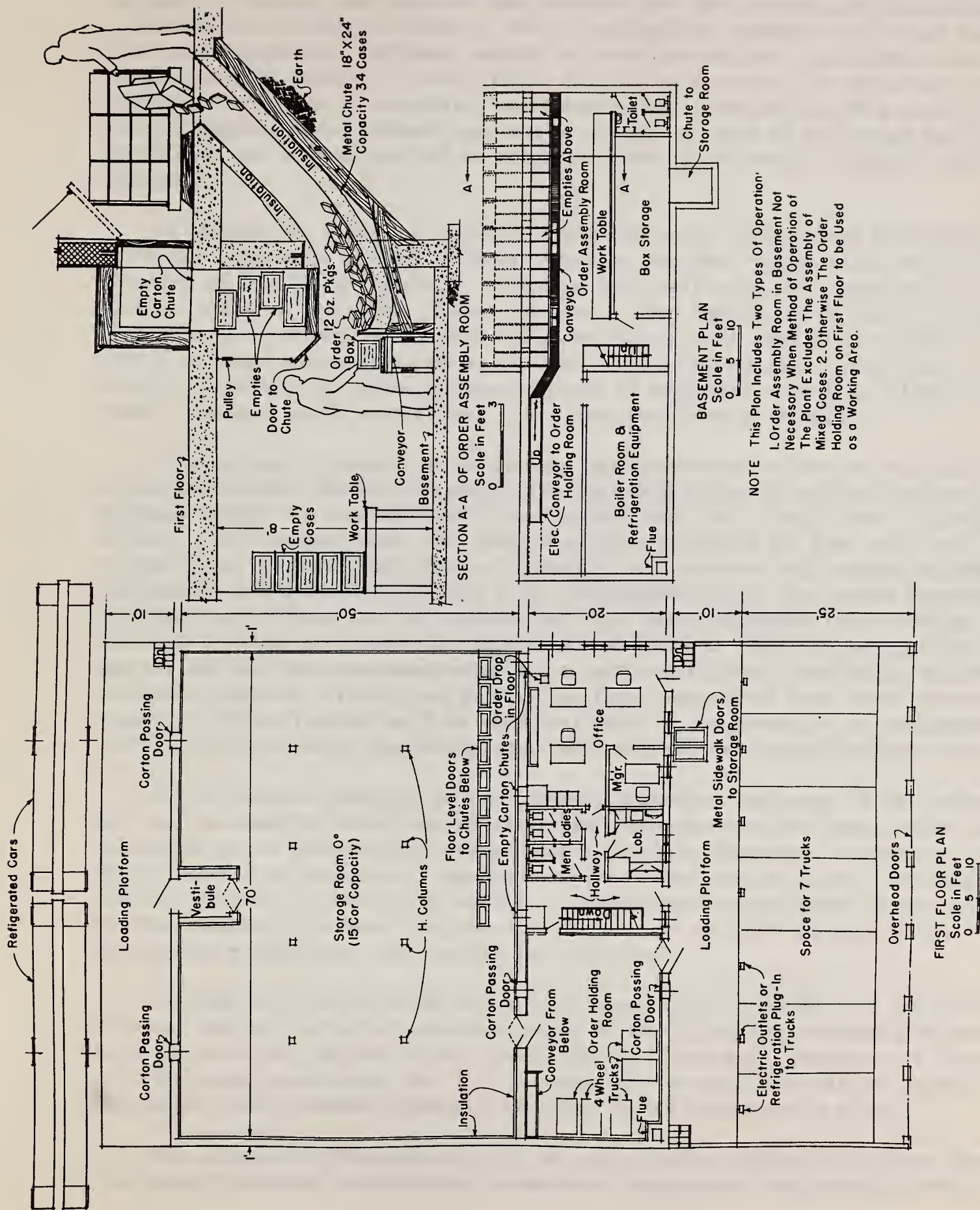


Figure 2.--Possible lay-out for a wholesale frozen food plant.



To obtain the data and information necessary to meet the objectives of this project, two basic types of studies are required: (1) Time studies or studies designed to measure the elapsed time required for the performance of handling operations with different types of materials-handling equipment, different crew sizes and arrangements, different methods of using the equipment, and under variable conditions with respect to facilities; and (2) cost studies of equipment with particular reference to operation, maintenance, and depreciation. With data from these studies and using assumed wage levels, the dollar costs of performing handling operations can be computed and an appraisal made of the merits of each type of equipment.

In the earlier stages of the work, 1,350 time study observations were made of unloading operations, using 6 different types of equipment either alone or in combination of 8 different package types from both rail cars and motortrucks at 4 distinct types of facilities. These time studies were made in 41 different cities. They were, for the most part, made under conditions which made it impossible for Branch personnel making time studies to control any of the variables with respect to crew size, methods of using equipment, items of equipment, stacking height, and others, and as a result a great many of the data have their limitations.

In an attempt to develop a solution to this problem and reduce the variability of the conditions, Branch representatives met with industry representatives in September 1949. At this meeting it was agreed that for a "trial run" selected members of the industry would make their warehouses available for time study work on a controlled or laboratory basis. Presently used methods and certain methods recommended by Branch personnel were to be time-studied with a view toward improving the handling efficiency of the cooperating firm. Since September 1949, studies of materials-handling operations have been completed in three fruit and vegetable warehouses, and work has been inaugurated in two additional plants. Preliminary reports have been prepared covering the work in the three warehouses where work has been completed. Final reports will be made available to the owners or to management shortly after the end of the fiscal year. These reports are of a confidential nature.

In the tentative adoption of the foregoing procedure, the scope of the project has been broadened to cover all materials-handling operations for fresh fruits and vegetables in the warehouses of cooperating wholesalers. Moreover, the coverage has been broadened to include all types of equipment used and all types of packages handled. However, in publishing reports of industry-wide significance it may still be found desirable to limit the coverage to the eight original package types, the six equipment categories, and the four facility groups.

Although the firms selected will receive what might be considered a consulting service, they are called on to make a number of costly and time-consuming adjustments in permitting the use of their warehouses as laboratories. Moreover, it cannot be too strongly emphasized that this is a means to an end, and that the emphasis remains on finding answers applicable or useful to the industry as a whole.

The results of the studies thus far tentatively completed indicate that considerable savings or reductions in man-hour requirements are possible, even in

the better managed warehouses, through the adoption of the more efficient methods of performing materials-handling operations with equipment now in use. As an illustration, these studies show that it is possible, in an unloading operation where two-wheel hand trucks are used, to reduce the total man-hour requirements around 20 or 25 percent through the adoption of more efficient methods.

Comparative time study observations to date indicate that possible reductions in labor requirements through the adoption of more efficient methods of using present equipment, with no modification of facilities, range from zero up to 40 percent. In some situations studied, the tentative conclusion is that with the present type and amount of equipment, the only appreciable savings that might be possible will have to come about as the result of increases in the volumes handled. However, it is not anticipated that too many cases of this kind will be found. Data assembled thus far are too inadequate to warrant even tentative conclusions as to the comparative efficiency of different types of equipment under the various conditions that exist in the industry. Moreover, before most fresh fruit and vegetable distributors select and purchase a great amount of new materials-handling equipment, they should determine how they can "get more" out of the equipment they now have. It has been found that ineffective use of equipment and labor greatly increases handling costs.

The manuscript for a publication entitled, "How Fresh Fruit and Vegetable Distributors can Get More Out of Their Materials-Handling Equipment," was completed and the report sent to the processing plant in June 1950. It includes methods and uses of equipment observed by people employed on the project which were outstanding in their application. It makes no attempt to point out to the industry the most efficient types or combinations of types of equipment to use for specific operations, but rather points out how innovations and improved methods can help do a better job with the equipment now owned.

The ultimate aim of this entire project is to determine in terms of cost and labor requirements the advantages and disadvantages of each type of equipment being used by the produce people, and to make available to the trade conclusions as to what types or combinations of types of equipment, according to volume of business and types of facilities used, will result in the lowest handling cost. However, from time to time it is expected that reports on certain aspects of the study may be released to give to the industry the results as soon as they are available, without having to wait for the completed study.

Data collected may also be used to determine the most efficient warehouse layout and design, including the correct platform heights for rail and truck unloading.

COTTON

The study of materials-handling in cotton warehouses has as its prime objective the determination of the relative efficiency and economy of particular types and combinations of materials-handling equipment, and of various materials-handling methods, that are used to perform the different warehouse handling operations.

For the purpose of developing, by means of time study and methods analysis techniques, the information necessary to determine the relative efficiency and economy of such equipment and methods, handling operations performed in cotton warehouses have been regarded as falling into eight broad categories:

1. Unloading rail cars and trucks.
2. Loading rail cars and trucks.
3. Weighing.
4. Sampling.
5. Transporting bales within the warehouse.
6. Stacking and storing.
7. Breaking out of stacks and storage.
8. Compression.

While these eight classes reflect the basic divisions among the different types of cotton warehousing operations, it has been found advisable in some instances, in order most effectively to employ the various time study and other analytical techniques, to subdivide further certain operations (for example, compression) into several smaller operations. On the other hand, certain other operations (such as unloading, weighing, and sampling) are frequently so closely interrelated and integrated in a particular situation that often it is best to consider them as a group (especially in the analysis of the recorded time data) rather than as separate and independent operations.

Although it may be conceded that in any cotton warehouse the various handling operations may be interdependent to a very great degree, it has generally proved best, in the conduct of our investigations, to analyze each operation independently of the other operations with which it may be associated. Once each operation has been thoroughly studied with reference to the various types of equipment and handling methods that are applicable, it then becomes possible to integrate the related operations in such a way as to effect, for a warehouse of any given design and capacity, a smooth and orderly flow.

During the past year, project engineers visited 58 different cotton warehouses in 32 cities located in Alabama, Arkansas, Louisiana, Mississippi, Missouri, Tennessee, and Texas. In performing this field work, 422 time studies were made covering, in varying degrees, each of the eight broad classes of handling operations. To this figure may be added the 60 experimental time studies made last year when time study techniques were being developed and perfected.

It is expected that analysis by the project engineers of the time studies thus obtained will be completed around the middle of the summer. This analysis should

indicate the types of operations and the various combinations of method and equipment that will require further study and, in some measure, the amount of study that may be required. It should also indicate whether there are any kinds of operations for which sufficient data may already have been obtained or for which perhaps, no data will ever be needed. The latter situation might arise where analysis shows a particular method or a particular type of equipment to be entirely unsuited to the efficient performance of a given handling operation.

It was originally planned that under this project only a final report would be written to cover all phases of materials-handling in cotton warehouses. However, in response to a request from the cotton warehouse industry, plans have been made to issue, in advance of the final report, a series of brief preliminary reports, each covering some segment of warehouse handling. The first two of these reports were published in May. The first report, entitled, "An Improved Method of Stacking Standard Density Bales in 'Cordwood' Arrangement," covered a method by which a simple change in the sequence or order in which bales were placed in the stack makes possible a reduction in the size of the stacking crew while at the same time maintaining or exceeding the usual rate of stacking. Thus, it has been found that a stacking crew of four to six men may be reduced to three with no loss (and frequently with an accompanying gain) in production. The second report presented, "A Comparison of Two-Wheel Hand Trucks and Clamp-Type Industrial Trucks for Transporting Uncompressed Bales of Cotton from Blocked Area to Dinky Press." Under the recommendations made by the project engineers with respect to improving this operation, which is one segment of a larger operation known as "compression," it has been possible to reduce the total crew size required for transporting bales to the press area from eight men (in the example discussed) to three men. This represents a reduction in direct labor costs of over 62 percent, although this gain is offset to some extent by the use of an industrial truck in lieu of hand trucks. (See figs. 3 and 4.)

Other reports are planned for release as soon as it is possible to complete the additional time studies required. Among the topics being considered are a recommended loading pattern for rail cars, better methods for unloading rail cars, comparison of portable and fixed platform scales in weighing cotton, methods of transporting bales within the warehouse, etc.

The study of maintenance, operation, and depreciation costs for various types of materials-handling equipment has not yet progressed to a point where a reliable estimate of these costs can be made. However, cost data continue to be received each month from a group of about 40 cooperating warehousemen. In time, these data, supplemented by other cost information, should afford a basis for making estimates of such costs. By adding to the money cost for labor (based on prevailing wage rates) for performing a particular type of operation the costs incurred by using the necessary equipment (i.e., cost of depreciation, fuel, oil, maintenance, repairs, insurance, taxes, etc.), the total cost of the operation is determined. This cost may then be used to measure the relative economy of different types of handling equipment and methods that can be employed for a given operation. This will be necessary before final appraisal of handling methods, systems, and equipment can be attempted.

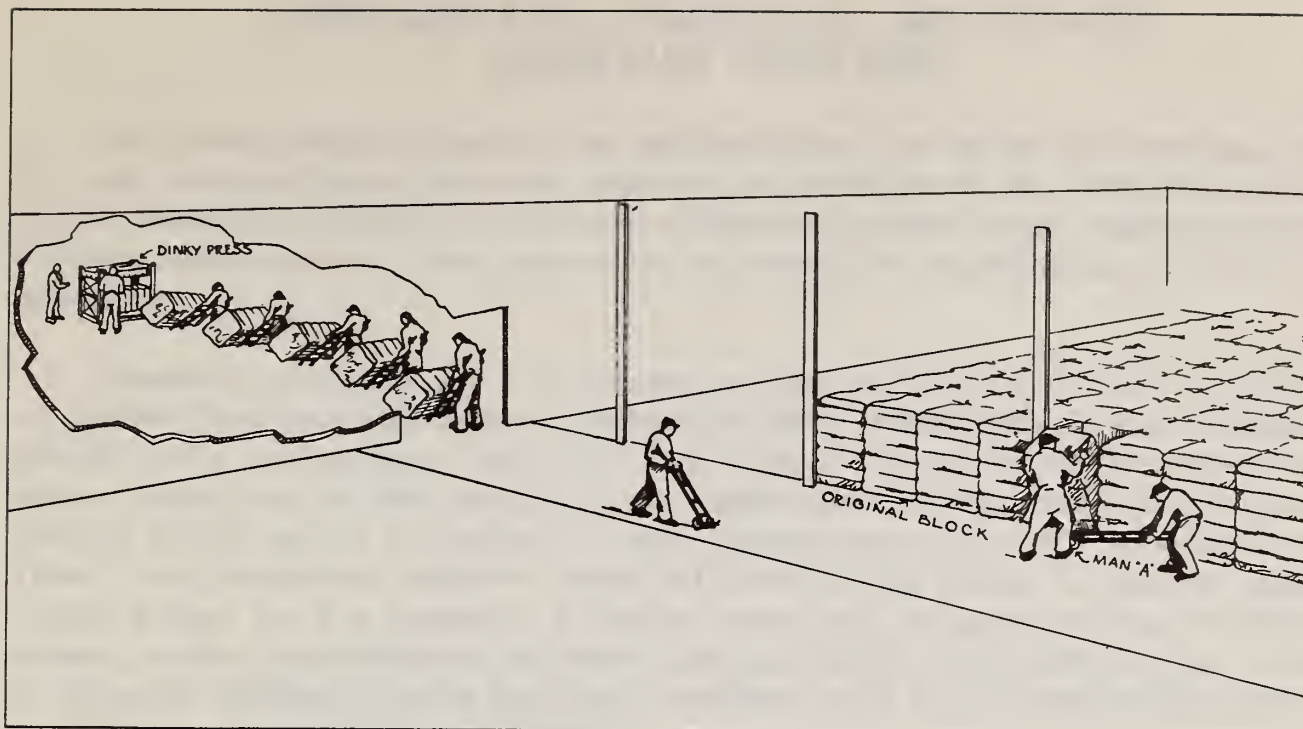


Figure 3.--The present method of feeding the dinky press by using two-wheel hand trucks and employing an 8-man crew. Note that 5 of the 7 hand truckers are waiting in line at the press.

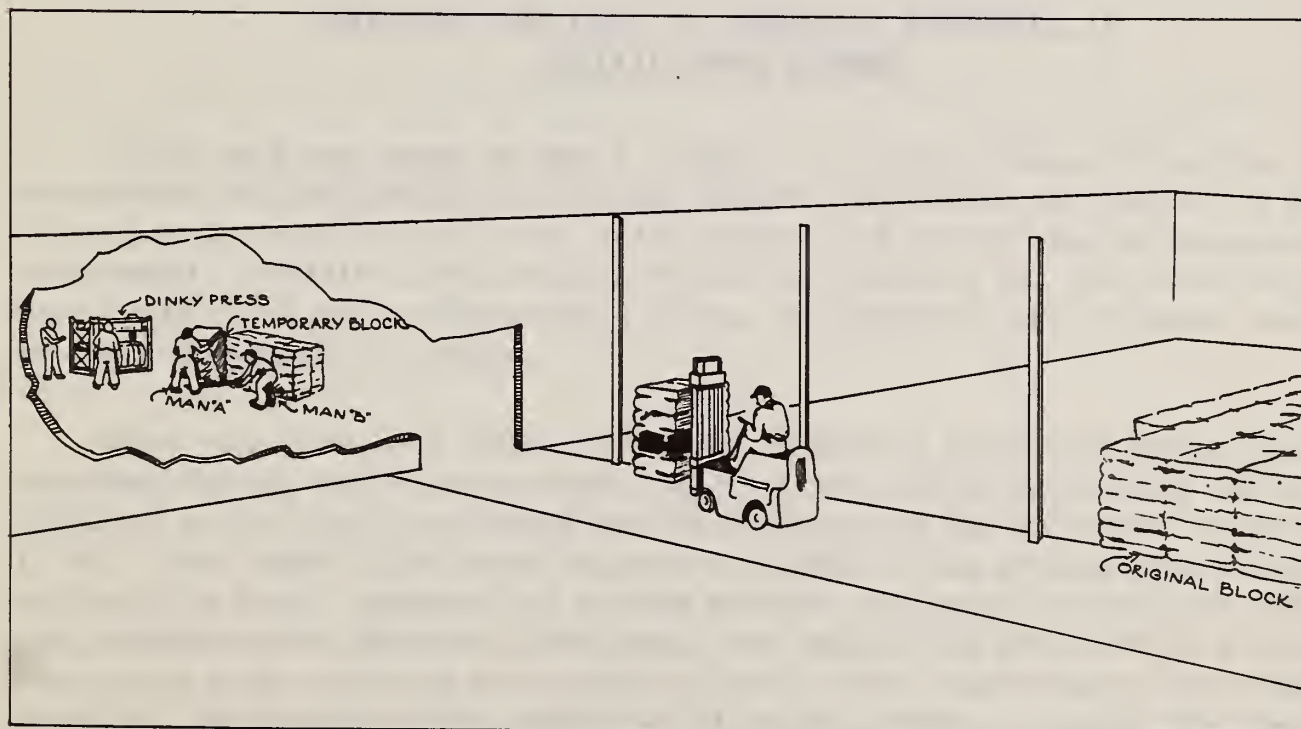


Figure 4.--The use of a two-bale capacity clamp-type industrial truck for transporting cotton from the original block to the temporary block at the dinky press. A three-man crew is employed in this operation.

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MERCHANDISING, PACKAGING, AND RELATED MARKETING FUNCTIONS

The Branch conducts research on merchandising, packaging, wholesaling, retailing, and other subjects where the emphasis is primarily on the function rather than on the commodity, in order to increase efficiency, reduce costs, improve quality and consumer acceptability, and, generally, to expand the distribution of farm or food products.

Research conducted for the purpose of improving the functions of marketing recognizes that many agricultural commodities have common distribution problems. The grocery store handles practically all food items, with some of the present-day supermarkets also handling many nonfood items. Improvement in the efficiency of operating grocery stores may be reflected in lower distribution costs for thousands of food items. Lower marketing costs are often reflected to the grocer in greater demand and higher prices for his products. Likewise, packaging or merchandising problems are common to most farm products marketed, and principles developed for one commodity or group of products can be applied, sometimes with only slight modification, to many products produced by the farmer.

Relatively little research has been done by agricultural research workers in several of the most important functional areas of marketing. It has only been with passage of the Research and Marketing Act that funds were provided for research by agricultural workers in the retailing and merchandising of farm or food products. Inasmuch as most of the research on retailing, merchandising, and packaging has been done with the distributors' interests foremost in mind, agricultural research workers have had to develop new techniques and research objectives.

REDUCING THE COST OF HANDLING PRODUCTS IN RETAIL FOOD STORES

Field work was begun on May 9, 1949, on a project whose objective is the development and application of improved methods, equipment, and lay-out in grocery departmental operations in retail self-service food stores. The following grocery departmental operations were studied: Receiving, checking in, price-marking, movement to sales floor, and stocking shelves. In addition, the checkout operation received considerable attention.

These operations were studied in stores of various volume and physical location and under varying conditions in several major cities. The first phase of the project, conducted in one city, constituted the major portion of the basic work in the study. In this first phase, time-study analyses were made of the several operations in 16 self-service stores representing various methods, equipment, and lay-out. Performance standards were developed from these time studies and were used as a basis for comparison with standards developed similarly after improvements were made and installed. Application of the principles of motion economy to each of the operations brought about considerable improvement in man-hour productivity. Following is a summary of accomplishment in each of these operations.:

1. Receiving: Grocery merchandise was unloaded from trailers by hand and stacked conveniently for pickup by two-wheel hand trucks, on which it was transported to the back room for storage purposes. The size of receiving crews varied from store to store, and production varied from 83 to 227 cases per man-hour. It was found that these minimum and maximum man-hour production figures could be increased to 314 and 358 respectively, through (1) the use of roller-skate conveyor, (2) the proper location of the various types of merchandise in the back room in relation to the unloading equipment, (3) segregation of merchandise by commodity group in the stacking operation, and (4) proper crew arrangement.

The cost of the conveyor equipment, plus the cost for building alterations where necessary, amounted to from \$179 to \$238 per store. Savings realized through increased man-hour production paid for these costs in all instances within a year and, in most instances, within a six-month period. Perhaps more important, however, is the fact that tractor and trailer tie-up time was reduced by an average of 45 percent.

2. Checking In: Merchandise was being checked in either as the trailer was being unloaded (requiring 4.4 man-hours per 1,000 cases) or after the merchandise had been stacked in the back room (requiring 2.4 hours per 1,000 cases). An improved method developed for performing this operation reduced man-hour requirements to 1.96 hours per 1,000 cases.

3. Price-Marking: Considerable variations in method were found to exist in this operation as performed by different operators in various stores. The average clerk was price-marking 45 cases of 24 No. 2 cans per hour. With improved methods, equipment, and lay-out, this production was increased to 87 cases per man-hour. The conveyor equipment purchased for use in the receiving operation proved to be of great value in moving merchandise from the commodity stacks to the point at which it was price-marked.

4. Movement of Merchandise to Sales Floor: Two-wheel hand trucks were used to move most of the merchandise from the point at which it was price-marked in the back room to the shelf. It was found that the time per case for the performance of this operation could be reduced by 45 percent through the use of 12- by 35-inch four-wheel platform trucks.

5. Stocking Merchandise on Shelf: As in price-marking, individual methods and resulting productivity varied considerably between individuals. Since this operation alone constitutes greater time requirements than all those considered thus far combined, the potential savings here through increased productivity are large. Improvements in equipment designed to pre-position the case of merchandise for maximum efficiency and ease of handling in the stocking operation resulted in a 25-percent increase in productivity over the best of any other method found in use. It was found that the average stock clerk, through the use of improved methods in all phases of the stocking operation, could increase his production by more than 40 percent.

The above operations were also studied in several stores in another major city. This location was selected because of two factors which were found to be different

from those in the first city: (1) Merchandise was stocked at night in the second city as compared with daytime stocking in the first; and (2) drop deliveries were used for grocery commodities, whereby trailers were left at the store for several hours for unloading. Time studies showed no significant differences in daytime vs. nighttime stocking, since the methods used were essentially the same in both areas. In the price-marking operation, however, the two areas differed considerably. Where drop deliveries were used, merchandise was checked in and price-marked on the conveyor equipment as it was being unloaded from the trailer, and a large percentage of the cases moved directly from the conveyor to the sales floor. These three operations (receiving, checking in, and price-marking), combined into a continuous production line, gave a production per man-hour of 48 cases. Through the use of improved methods, equipment, and lay-out, and, more particularly, through better crew organization, production per man-hour increased to 67 cases.

The major grocery departmental operations as described above were also studied in a third city in a comparatively new type of self-service food store, which permits stocking of grocery shelves from the rear. Several of these operations were studied, but comparative productivity figures are as yet not ready for release.

6. Checkout: The importance of the checkout operation is indicated by two factors: (1) It represents 21 percent of all hours required for retail self-service store operation; and (2) it is a recognized fact in the industry that sales volume is to a large extent affected by customer service given at this bottleneck operation. Most of this work on the checkout operation was limited to stores in one city. An analysis of conventional equipment showed that the component parts of the job, called elements, required the following percentages of the total time for the entire operation:

- (1) Sort merchandise into departmental groups (meat, produce, and grocery)--13 percent.
- (2) Ring up order (including subtotal, add tax and total order)--30 percent.
- (3) Receive money from customer--5 percent.
- (4) Make change, give to customer--10 percent.
- (5) Obtain bag (or box)--6 percent.
- (6) Bag items--28 percent.
- (7) Other irregular elements (those infrequently occurring but necessary parts of the operation not listed above)--8 percent.

It appeared that possibilities for improvements lay primarily in revision of elements (1), (4), and (6). An experimental checkout unit (called the "Simplex") was designed and constructed which incorporated the following changes in method and procedure: (1) Sorting of merchandise was eliminated; (2) the ringing and bagging of items was combined into a simultaneous operation; (3) the making of change was facilitated through the installation of an automatic coin changer.

This experimental unit, requiring only 60 percent of the floor space required for the conventional equipment, as a one-man operation, was found to increase man-hour operation from 32 orders to 44 orders (based on 14.29 ring-up items per order). Advantages that were gained from this equipment other than lower cost of operation through higher man-hour production were: (1) Improved customer service; (2) improved accuracy in the ring-up of items to the proper department; (3) a 10-percent improvement in accuracy in the making of change. Disadvantages were found to center primarily on the lack of flexibility of the equipment. Since this equipment was limited to a one-man operation, it was not possible to add additional help during hours of peak loads. This equipment is still very useful, however, in stores ranging up to \$15,000 weekly volume, or in stores where volume is fairly well distributed throughout the week.

In order to overcome this problem of lack of flexibility, another checkout unit (called the "Rapi-check"), was designed and constructed which contained the principles of the experimental unit in order to maintain the low one-man operating cost. This later unit incorporated the use of a seven-foot belt conveyor (operated by the cashier with the use of a foot switch) to bring the merchandise to the cashier's position from the point at which it was deposited by the customer. This "Rapi-check" conveyor checkout equipment overcame all objections to the experimental unit and maintained the 44 orders per man-hour productivity figure as a one-man operation. Furthermore, as a two-man operation, this unit bettered production for a two-man operation on the conventional equipment by 27 percent.

Several other types of checkout equipment found in use were studied for comparative purposes. Among these was a 14-foot continuous belt conveyor unit operated by four men during peak periods, which was designed to give maximum production during these hours. Productivity is 7 percent less on this equipment, using four men, than on the Rapi-check unit, using three men. Similarly, all other types of checkout equipment studied showed less man-hour and over-all production than the Rapi-check. This unit has been installed in several other sections of the country and is receiving widespread acclaim.

The final phase of the project has been concerned with the application of results obtained to stores in sections of the country other than those in which the basic material was gathered. The application phase has been carried on in three other major cities. Although acceptance of the material has been excellent thus far, no figures representing actual installation of improved methods and equipment are yet available. In one location, the approach for adopting improved methods, etc., has been that usually known as "work simplification," which consists of training management and employees in the principles of motion economy and assisting these personnel in the development of such improvements. Comparative figures for this approach vs. the selling technique used in the two other cities should be available within a few months.

A patent on the check-out counter developed has been applied for and dedicated to public use. Reports on all these studies are being written and will be published in the near future.

PREPACKAGING OF PERISHABLE FOOD PRODUCTS

Self-service retailing is probably the most significant recent development in reducing food distribution costs. The trend toward further extension of self-service merchandising of food continued during the past year, although fresh fruits and vegetables, meats and animal products are the most difficult items to adapt to the self-service method of retailing. In prepackaging these fresh products in consumer size units for self-service merchandising, it must be kept in mind that they are perishable foods in contrast to being preserved in any form, such as canned foods, and consequently every effort must be taken to keep them in a high quality condition. The package itself plays an important function--it must be transparent to enable the housewife to see and appraise the quality and condition of the product before selecting her purchase; it must be durable to withstand considerable handling, moisture, as well as varying temperatures; it must be easy to handle, display, and stack well; and above all it must be inexpensive. The primary purposes of prepackaging perishable foods are: (1) To improve their salability; (2) to make them self-service items in order to increase retailing efficiency; (3) to simplify shopping and meal preparation; and (4) to reduce transportation and handling costs by leaving the inedible parts near the point of production.

Vegetables at Point of Production

Further progress was made during the past year in developing new methods of prepackaging vegetables. One of these experiments is being carried on in cooperation with the Florida Vegetable Prepackaging Council and the Florida Agricultural Experiment Station. Under the terms of a cooperative agreement, funds have been made available through the Branch to the Florida Vegetable Prepackaging Council for the purpose of developing and appraising the feasibility of prepackaging vegetables at source of production. This Council, which is composed of growers, shippers, transportation agencies, and suppliers of equipment, has made possible the conduct of research on large-scale experiments at a minimum cost. Research funds were not used except for the payment of salaries of professional and technical personnel and for the purchase of necessary expendable equipment and supplies. The actual growing, harvesting, packaging, and shipping of prepackaged vegetables were undertaken on a commercial basis by the cooperator. This has made it possible to evaluate the feasibility of such an operation under normal conditions and has resulted in the setting up of a model plant and type of operation that can be copied or adapted by other firms or growers in other areas of the country.

One of the most important reasons for prepackaging vegetables at point of production is to reduce the cost of packaging, refrigeration, and freight on the inedible parts of vegetables. These inedible parts of vegetables can be trimmed off in the prepackaging plant and used as stock feed or to replace organic matter in the soil.

During the past year several hundred acres of vegetables were grown, harvested, and shipped primarily in prepackaged form. They included 600 acres of yellow sweet corn; 150 acres of cauliflower; 140 acres of broccoli; 15 acres of brussels sprouts, and over 100 acres of mixed vegetables, including kale, mustard greens, turnips, radishes, carrots, spinach, red and green cabbage, escarole, and chicory.

Celery

Limited studies were made on the prepackaging of celery grown in the Sarasota, Fla., area and transferred to the cooperator's prepackaging plant for packaging. The heavy investment normally required to set up a prepackaging plant properly, including packaging machinery, refrigeration facilities, and inventories of supplies, makes it desirable to carry on as many pre-tests as possible on a small-scale basis before enlarging to a commercial-scale operation. For that reason, the celery was transferred from the producing area to the cooperator's plant and packaged in two ways--whole stalks and separate leaves. The higher priced prepackaged celery (both whole stalks and leaves) moved relatively slow in comparison with bulk celery and, although the consumer acceptance was not too encouraging at a sizable price differential, further tests are planned next year inasmuch as it is known that the shelf-life of high quality celery can be lengthened by a semi-moisture-proof package.

Broccoli, Cauliflower, and Sweet Corn

Studies on the prepackaging of broccoli, cauliflower, and sweet corn were conducted during the 1950 fiscal year. These studies have been carried on for three fiscal years--1948-50. One progress report was issued in 1949, covering the early experiments on the prepackaging of sweet corn. However, inasmuch as the cost and selling prices vary from year to year, as well as the quality of the product itself, it was not considered advisable to draw conclusions from any one year's operation. All the necessary data were gathered by June 30, 1950, and will be analyzed and published during fiscal year 1951.

In general, it appears as though prepackaging of cauliflower, broccoli, and sweet corn is economically feasible, although in most instances the additional cost of packaging materials, supplies, and labor necessitates a somewhat higher price to the retailer than for comparable bulk produce. There appears to be a sufficient number of consumers who are willing to pay for additional services, provided by washing, trimming, and preparing the vegetables for use in the home, to establish a sizable market for these prepackaged vegetables. Part of the additional expense of prepackaging the vegetables is offset by the elimination of paying the cost of refrigeration, handling, and transportation of the inedible parts of the vegetables. Over half of the weight of bulk sweet corn normally shipped to market was retained on the cooperator's farm and used for stock feed. Only the edible parts of the ears which had been husked and trimmed were prepackaged and distributed to the consumer.

Another advantage in prepackaging vegetables at point of production is that ill-shaped, oversize, or small but otherwise high quality produce can be trimmed or segmented and distributed at no price discount. Sweet corn, for example, was packaged this past season in 5- by 7-inch trays which contained either three 7-inch ears or four 5-inch ears or six 3½-inch ears. This enabled the utilization of all the various size ears, except under 3½ inches, whereas it is impossible to harvest and market profitably small size ears of corn in the husk. In all three types of packages the consumer was getting the same amount of corn for comparable quality, and could choose the type of package needed in terms of size of serving or number of servings desired.

A similar situation was found in the case of cauliflower inasmuch as the edible parts of bruised or damaged heads can be harvested and segmented and successfully distributed in prepackaged form. A market was also established for second-growth broccoli shoots which enabled the utilization of a greater yield of broccoli than is normally obtainable when it is marketed in bunch fashion.

For broccoli, cauliflower, and sweet corn, it now appears to be particularly profitable to the grower to prepackage them when he can utilize and market a greater portion of his best quality crop. On the other hand, when high quality produce is abundant and prices are low, and during periods of low consumer purchasing power, it would appear to be less profitable to prepackage vegetables by investing in the additional expense of higher cost packaging materials and packaging labor. For these reasons, it would now appear as though prepackers of vegetables should maintain a more or less flexible position in order to take advantage of the variation in quality of crops and different price structures. Reports are being prepared for publication showing the results of research on prepackaging of sweet corn, broccoli, and cauliflower at point of production.

Vegetables at Terminal Point

Spinach and Kale

Studies were completed this past fiscal year on prepackaging of spinach and kale by terminal point prepackers. It is estimated that more than half of the spinach and kale now being marketed throughout the country is retailed in prepackaged form rather than in bulk form, which indicates that many consumers have decided to pay for this additional cost rather than perform certain work themselves in their own homes. These studies were carried on in cooperation with the University of Maryland and under the terms of a contract with a private firm. The primary objective of these studies was to determine the cost of prepackaging spinach and kale, how to reduce these costs, and to evaluate the consumers' reactions to bulk and prepackaged spinach and kale. It was learned that about half of the cost of prepackaged spinach was the cost of the spinach itself, about one-fourth for packaging labor, and one-fourth for packaging materials. The expense of prepackaging spinach can be reduced by having the spinach clipped at the source of production. It costs the spinach prepacker nearly 30 cents more per bushel to prepare root spinach for packaging than the clipped spinach. Considering the differences in yield of root and clipped spinach, the prepackers can pay from 50 to 60 cents more per bushel for leaf spinach than for root spinach. Growers and shippers of spinach might well consider marketing a greater portion of their crop in clipped form in order to reduce the expense of transportation and refrigeration.

Another means of reducing the cost of packaging spinach and kale was found by eliminating the extra expense of using highly printed film. Many prepackers use printed cellophane in order to display prominently their brand name, although in many instances the printed material reduces the visibility of the product within the package. For this reason, a test was undertaken to determine consumer acceptance of spinach packaged in plain transparent film bags in contrast to printed transparent film bags. In each case the brand name was also prominently displayed on a saddle

label at the top end of the bag. In five stores, for five weeks, the plain bag out-sold the printed bag by a small but significant margin. It is, therefore, recommended that prepackers use a minimum amount of print on their packages in order to reduce expense as well as to increase visibility of the product. In this case the savings would amount to about 6 cents per carton of 12 bags.

The cost of retailing prepackaged spinach and kale was considerably less than for bulk spinach and kale, inasmuch as spoilage losses as well as direct retail labor costs were greatly reduced which made the prepackaged spinach and kale relatively more profitable to retail at prevailing mark-up rates than bulk spinach and kale.

Tomatoes

One of the more important vegetables which is commonly prepackaged today is tomatoes. The production of this vegetable is particularly important in the Southern States during the fall, winter, and spring seasons. The tomatoes are picked green and shipped to the northern terminal markets in three different types of containers: Lugs, field crates, and wire-bound boxes. Until recent developments in prepackaging tomatoes in terminal markets, most of the green tomatoes were hand-wrapped in paper and place-packed in lugs according to size, and sold directly in the terminal market for distribution to the retail trade. Obviously, it appears uneconomical and unnecessary to hand-wrap green tomatoes if they are to be repacked again in the northern terminal markets, but about half of these green tomatoes are still shipped in this way.

Another problem confronting the tomato prepackaging industry is high costs resulting from inefficient packaging techniques. Many of the tomato prepacking plants have come into existence during the space of a very short period of time, and the operation is not yet sufficiently standardized whereby particular packaging techniques are recognized as being the most efficient. For that reason a study was undertaken to evaluate the productivity of labor and the efficiency of various types of machinery, equipment, and plant lay-outs, in order to develop a more efficient method of operating a tomato prepacking plant. A preliminary survey was made of tomato prepackaging plants located east of the Mississippi River in various terminal markets to ascertain their volume of business and to classify them in regard to the types of shipping containers used.

As a result of this preliminary survey, 15 tomato prepackaging plants were selected representing various size groups and representing those purchasing tomatoes in different types of containers. Detailed studies were undertaken in these 15 plants to evaluate the relative efficiency of the various steps involved in prepackaging tomatoes and in relation to the utilization of labor, plant lay-out, machinery, equipment, and packaging materials. As a result of this study it will be possible to recommend to the tomato prepackaging industry various packaging techniques and practices which are more efficient.

Another problem confronting the tomato industry is the fact that some tomato prepackers are alleged to be packaging and distributing inferior quality tomatoes,

which may result in lack of confidence on the part of consumers in prepackaged tomatoes. A study was therefore undertaken to evaluate the average quality of prepackaged tomatoes available for purchase in retail stores. A representative number of prepackaged tomatoes representing various brands was purchased in 10 retail stores; detailed quality and condition observations were made. The field work was completed by the end of the past fiscal year. An analysis of the results will be undertaken during the coming year and a report will be prepared for publication.

Fruits at Point of Production

Apples

Efforts were expanded during the past year to develop a satisfactory method of prepackaging apples at source of production. The consumption of apples has shown a steady decline over the last 20 years, and it was expected that if a satisfactory method of prepackaging apples could be developed, the salability of the product could be improved with no increase in the total cost of the distribution of apples.

During the 1949 fiscal year an exploratory study was carried out under contract with the Washington State Apple Advertising Commission to explore the possibilities of packaging apples in consumer size containers at the shipping point. These studies were undertaken in the Northwest primarily because of wider application of the results there than would be possible in apple production centers closer to the consumer market. The first year's work indicated rather promising prospects; consequently, a second contract was drawn up and entered into to do further work in this field during the 1950 season.

The Contractor undertook: (1) To assist the apple industry in developing improved methods of prepackaging apples; (2) to measure the comparative cost and efficiency of prepackaging apples in different ways and in relation to bulk packed apples; and (3) to measure the comparative salability of apples packaged in different ways, indifferent types and sizes of containers, and in comparison with bulk apples. The Contractor completed the work, as scheduled, and submitted a report on the accomplishments of the project early in June 1950. It is anticipated that results of this year's work, along with the 1949 exploratory study, will be combined into a formal report and published during the coming fiscal year.

One purpose of this project was to develop a consumer package which would increase the salability of the apples by enhancing their general appearance and maintaining their quality and condition by prevention of bruising and maintenance of a high moisture content in the package to insure the delivery of crisp juicy apples to the ultimate consumer.

One of the disadvantages of using mesh bags, which had been used for prepackaging apples, is that apples are frequently cut or bruised by the thread. In mesh bags apples become shriveled and lose their crisp and juicy condition. For these reasons a relatively moisture-proof plastic film bag was chosen, for experimental purposes, which kept the apples in a more satisfactory condition and enabled maximum visibility of the apples to the shopper when making her purchase. Although the mesh bag had

been used previously for shipping Northwest apples, it was completely abandoned, on a commercial basis, during the 1950 fiscal year. The transparent film bag, developed under this research project, is now the most widely used package. Seventy-one cars of film bagged apples were shipped during the 1948-49 season, and 132 cars during the 1949-50 shipping season.

Limited studies were also undertaken on prepackaging apples in a corrugated fiber board window carton. This package offers more bruise protection than film or mesh bags, although it does not have the display and visibility advantages offered by them. Studies made in 1949 indicated that the 5-pound size package would be quite acceptable. It was found during the past year, however, that a 4-pound package would sell more apples in a given store than a 5-pound unit, and that a 3-pound unit moved a still greater quantity of apples than either the 4- or 5-pound unit. For that reason the 3-pound package was generally used during the past year.

In 1949, an apple packing device was developed for automatically transferring apples from a conveyor belt into a 5-pound bag, although it was found relatively unsatisfactory for the 1950 crop because of a much higher proportion of large-size apples. Therefore, a modified bagging chute was developed during the past year which enabled the place-packing of apples on the chute, and a transparent film bag with an elastic top was drawn up over the chute. The apples were then pulled off into the bag by an operator, resulting in place-packing large size apples in the 3-pound bag. This made a neat and attractive display unit and helped to reduce bruising.

A vast number of motion and time studies were made which resulted in increasing considerably the efficiency of the packaging operation so that the direct labor cost of prepackaging apples in consumer-size bags was, in most instances, less than packing the apples in the previously used standard wooden box. The cost of packaging materials, including the film bags and the corrugated shipping container was higher, of course, for these prepackaged apples than for the standard boxed apples. The savings gained in increased efficiency of retailing prepackaged apples over bulk apples by lower waste and spoilage losses and elimination of excessive handling in the retail stores will, of course, offset a part of the extra expense of packaging materials. It appears as though the prepackaging of apples is desirable from the standpoint of increasing their salability, provided that the additional costs to the retailer do not exceed about one cent per pound of apples.

A number of studies were conducted on the comparative salability of prepackaged apples by making controlled test shipments from the State of Washington to various terminal markets. These test shipments were made to Chicago, Kansas City, and Los Angeles. One test, for example, indicated that the extremely durable and less costly translucent polyethylene bags met with as favorable consumer response as did the more transparent rubber hydrochloride bags. Both types of film packages far outsold identical apples in mesh bags. All three types of packages were filled by the same operators, packed in the same shipping cartons, shipped in the same railroad cars or trucks, and retailed in the same stores. It was also discovered that a larger range of sizes and a greater range in the color of the apples were being accepted by consumers in consumer packages than in bulk displays. A detailed report will be prepared for publication during the coming year.

Cherries

Studies were inaugurated late in 1950 on the prepackaging of western fresh sweet cherries. The customary methods of hand-row packing cherries in lugs is extremely costly because the cherries are sized by hand and place-packed in the bulk wooden containers by hand. The two top rows are faced and each individual cherry is placed in its proper position, one at a time, by the packer. In an effort to reduce this cost of packing cherries, research studies are being undertaken, under the provisions of a contract with the Washington State Fruit Commission, to develop an efficient and effective method of prepackaging cherries at point of production in consumer-sized units. It is expected that a method can be developed whereby cherries can be semi-automatically transferred from conveyor belts into consumer-sized containers at less expense than the labor required to row-pack them in standard lugs, and that the cost of retail labor required to sell the cherries in the grocery stores and spoilage losses can be materially reduced.

This work is just getting underway in the 1950 cherry season. It is being undertaken in the Western States of California, Oregon, and Washington in cooperation with cherry shippers in all three States.

Fruits at Terminal Point

Apples, Pears, etc.

A contract was negotiated and executed with a service wholesaler at Hagerstown, Md., providing for research on sizes and types of consumer containers for prepackaging fruits. This contract will enable the prepackaging of experimental quantities of fruits at the service wholesaler warehouse for direct distribution to retail stores. Fruits, such as pears and apples, will be prepackaged in different sizes, designs, and types of packages in order to find out which packages meet with the greatest consumer acceptance. It is believed that the market for some fruits, such as perishable pears, can be expanded by protectively packaging them in the right types of packages and in the right size units. This work will get underway during the 1951 fiscal year.

Meat, Poultry, and Other Animal Products

The prepackaging of fresh meats and animal products was developed primarily to enable the retailing of meats on a self-service basis. More than a quarter of a century ago, there was evidence that many consumers would prefer to make their own selection of foods in retail stores. Although most dry groceries were readily adaptable to the self-service system of retailing, meats, poultry, and dairy products have been difficult to adapt because of the technical problems in developing satisfactory wrapping materials and methods of wrapping and displaying them in open display cases.

Even though a few self-service meat departments were established during the war, it was not until 1948 that a national distribution of such stores was apparent. At the close of that year about 400 stores were in operation which sold practically

100 percent of their meats on a self-service basis. It has been estimated that during the following 1½ years, the total number of 100 percent self-service meat departments increased to 2,000, and of partial self-service stores to 10,000.

Nation-wide Survey of Retailers of Prepackaged Meat

A Nation-wide survey of the problems and experiences of retailers who were retailing prepackaged meats on a 100-percent basis was made in 1949 to obtain information on the cost of operation, rate of packaging, methods of wrapping and sealing, and other merchandising problems. This study was made for the benefit of operators of self-service meat departments and of those considering the conversion of a service department to self-service or the installation of a prepackaged meat department in a new store.

Although this survey was conducted during 1949, the report on the study was prepared for publication and released during fiscal year, 1950. Ten thousand copies were distributed, and the report has been widely acclaimed as an outstanding contribution to the development of retailing prepackaged meat.

Personal interviews with retailers were made in 65 chain stores and 32 independent stores located in 80 cities in 27 States and the District of Columbia. A store was classified as a chain store when it was 1 of 3 or more owned by an individual or company. Thirty-four chain companies are represented in the chain-store sample. The method used to determine the stores to be surveyed provided for an equitable distribution, both geographically and by type of ownership. In addition, there was a fairly equal distribution based on sales. These 97 stores represented about 25 percent of the existing self-service meat departments then in operation. A summary of the findings of this survey indicated that of the 97 stores surveyed, 88 were found to be less than 2 years old, and 61 of these were less than 1 year old.

Ten of the self-service departments had average weekly sales of less than \$2,000; 52 had sales of from \$2,000 to \$6,000; 19 from \$6,000 to \$10,000; and 16 more than \$10,000. In 55 of 83 stores reporting total store sales, meat sales ranged from 20 to 34 percent of total store sales, 3 stores reported less than 20 percent, and 25 stores more than 34 percent. All fresh meats and most all other meat items, except frozen meats and frozen poultry, were prepackaged in the stores. As the sales volume of stores increased, the efficiency of labor increased. The number of pounds of meat handled per man-hour by all labor (skilled and unskilled) increased from 17 pounds per man-hour in stores with a weekly sales volume of \$2,000 and under, to 29 pounds per man-hour in stores with a volume of over \$10,000.

Total labor costs of all self-service departments averaged 4.5 cents per pound of meat handled, and 5.2 cents per package. Stores in the two smallest volume groups--\$2,000 and under, and from \$2,001 to \$4,000--exceeded these average labor costs per pound and per package primarily because of their high costs for skilled labor. The unskilled labor costs in these two groups of stores either were below or equaled the average for all stores, indicating that cutters were performing some of the unskilled tasks, such as wrapping and sealing. As the volume increased, the number of hours of unskilled labor mounted more rapidly than skilled, reflecting a more efficient utilization of skilled labor.

Wrapping film MSAT-80 was used by all stores for packaging fresh meats. The next most frequently used film was LSAT. Other films used were MST-52, Pliofilm, MSBO and Lumerith. All films were subject to some degree of criticism. The most common were: (1) Lacks visibility, (2) does not seal readily, (3) breaks or crumbles frequently, and (4) fails to prevent discoloration. More than half of the stores used sheet film in four to seven sizes. Sizes most frequently stocked were: 10 by 10 inches, 12 by 12 inches, 15 by 15 inches, and 10 by 12 inches. Roll film was most commonly used in 15- and 18-inch widths.

Stores with a weekly sales volume of more than \$10,000 had an average of 76 linear feet of refrigerated display cases, and average sales of \$146 per foot. These figures were about twice the average for length of display cases and four times the sales averaged per linear foot, for stores with a sales volume of \$2,000 and less per week.

Three-fourths of the retailers reported that fresh beef, veal, pork, and lamb remained in a salable condition in display cases for 48 to 72 hours. The majority of these reported 48 hours as the maximum. Discoloration is a major factor in determining the length of shelf life in display cases. Principal cuts on which it was a problem were beef steaks, beef roasts, sliced ham, luncheon meats, cold cuts, lamb, and veal. The importance of color in retailing meat was brought out by the fact that only 5 of the 97 retailers stated their customers were indifferent to color and bloom (freshly cut meats achieve their best color between 15 and 30 minutes after cutting).

All stores had adopted measures to prevent discoloration before wrapping, among these were: (1) Plattering before wrapping (meat cuts were placed on trays for a short time to allow the free fluids to drain from cut before wrapping; (2) using oxygenic paper (sheets of oxygenic paper were placed over and under the freshly cut unwrapped meat cuts to aid in maintaining color and to absorb some of the free liquids); and (3) allowing for a blooming period. Ninety of the 97 stores had adopted measures to prevent discoloration after wrapping. Those most frequently reported were: (1) Turning packages face down; (2) keeping meat well refrigerated; and (3) placing packages on display as needed.

Handling by the customer was the principal cause for rewrapping packages. Items on which rewrapping exceeded the average were beef roasts, beef steaks, and pork roasts.

There is little doubt about consumers accepting this new method of retailing meat. Sixty-seven stores stated that their customers reacted enthusiastically to their self-service departments, and 28 reported that customers were moderately enthusiastic. Only 2 reported its departments had not been well received. Of the 51 stores that had converted their service meat departments to self-service, 46 experienced increased sales. They reported 130 instances of increased sales on 14 meat items, and only 30 instances of decreased sales on 12 items. The items leading in increased sales were offal products, beef steaks, and poultry. Smoked ham led items on which sales decreased. The 97 stores reported 180 instances of favorable comments by consumers regarding self-service departments. These comments fell into

16 groups. They reported only 50 instances of unfavorable comments which were classified into 12 groups. The most frequently reported favorable comments were: (1) No waiting, by 46 stores; (2) better selection, by 26; and (3) purchase to suit household budget, 12. The 2 leading unfavorable comments were: (1) Miss personal contact with store personnel, reported by 22 stores; and (2) prefer to see meat cut, by 8.

Self-service, however, has not eliminated special services, and 90 of the 97 stores provided them. The most common request was for cuts in thicknesses not available in the display case. Generally, such patrons sought cuts which were thicker than those on display.

The store operators reported a total of 51 problems confronting them in the operation of their self-service meat departments. Thirty of these fell into three general groups: (1) Discoloration; (2) packaging techniques; and (3) labor efficiency. The solution of many of the problems depends upon research.

Cost of Rewrapping Prepackaged Meats and Poultry

A study is underway which is designed to measure the cost of rewrapping prepackaged meat products. A typical supermarket prepackages somewhere between 10,000 and 15,000 packages of meat per week, and a considerable number of packages are rewrapped--probably somewhere between 5 and 10 percent. Reasons for rewrapping fall into three groups: (1) Reconditioning the package--in many instances the packages are torn from handling by customers or become messy in appearance because of leakage from the meat; (2) reconditioning of the meat--one of the most frequent problems is discoloration of the meat caused by cut surfaces of the meat being exposed to the light and air, resulting in loss of color and bloom of the meat and in some cases the meat must be trimmed or completely thrown away, if spoiled; (3) price changing--in most cases the label is placed between the meat and the overwrapped film. In such case, rewrapping of the product is necessary in order to change the price on the label. The number of packages that have to be rewrapped for these reasons, in selected retail stores, was recorded by types of products in order to ascertain for which types of meat or cuts the problem is most important. Not only is there a loss of the meat, as well as the packaging materials when products have to be rewrapped, but the labor involved in rewrapping the meat is also a cost factor. It is hoped that by the use of proper refrigeration and packaging materials the need for rewrapping meat can be reduced to a minimum. It is also expected that a system can be developed whereby the demands for specific cuts of meat can be more accurately estimated which would reduce the cost of rewrapping. Inasmuch as it costs around 5 cents per package to cut and package meat, the importance of the problem is obvious.

Application of Results and Assistance to the Industry

It is necessary to assist the industry in adopting new methods and practices in prepackaging and distributing prepackaged commodities. As further progress is made in research in developing satisfactory methods of prepackaging fruits and vegetables, meat and poultry products, it is obvious that increased efforts have to be spent in

getting the improved methods and practices adopted by the industry. During the 1950 fiscal year, demands from the industry for guidance and assistance in prepackaging perishable foods were greatly increased.

Several sweet corn prepackaging operations have been set up throughout the United States which have been patterned or adapted from the operation set up under the Florida research project. One progress report on the sweet corn operation, issued in 1949, was widely distributed to the industry to serve as a guide in setting up other operations. However, requests for special service or attention to pertinent problems of individual prepackers are more frequently received and, consequently, occupy a greater share of the time of personnel engaged in these projects.

A paper was prepared and orally presented before the First National Conference on prepackaging of produce entitled "The Outlook for Prepackaged Produce." This paper endeavored to give the industry the benefits of our research and information by appraising them on the advantages and disadvantages of prepackaging specific fruits and vegetables and at which point in the marketing system they might be prepackaged. This article was reprinted in various trade journals, and copies were sent to all members of the Vegetable Growers Association. A similar report was presented before the Canadian Fruit Wholesalers annual meeting in Montreal, Canada, during the early part of February. A Nation-wide radio discussion of these research projects was broadcast to an estimated audience of 2,000,000 listeners.

Exhibits showing the proper use of various packaging materials and methods of prepackaging fruits and vegetables were prepared and shown in cooperation with the Virginia Food Council at the Atlantic States Annual Food Exposition in Richmond during the fall of 1949. This exhibit was viewed by an estimated 250,000 people.

A sound and color movie prepared by the Washington State Apple Advertising Commission, showing the results of research being carried out on the prepackaging of apples, was released and presented before various trade groups throughout the entire United States. This movie showed the techniques and methods of prepackaging apples developed under the research program, and it was made available to various apple producers and shipping organizations in all sections of the country and was frequently shown before personnel of individual companies engaged in distributing or retailing prepackaged foods. Articles on the progress of the research studies on apples were released in the Apple Research Digest, monthly publication published by the Washington State Apple Advertising Commission.

Another indication of the application of the results of this research may be shown by the fact that one Eastern apple packer distributed over a half a million bags of apples prepackaged in film bags, a method developed under this research program.

Necessary steps have been taken to secure a patent on a bag-filling device developed for packaging fruit in film bags. As soon as this device is patented, along with the model developed during the past season, it will be dedicated to the public in order to enable its use on the part of the entire industry.

A tomato prepacker was assisted in designing a new tomato packaging plant incorporating many of the most efficient types of machines and packaging techniques.

Special requests for information on specific problems in prepackaging and distributing prepackaged foods are received in considerable volume, and although previously released publications answer a considerable portion of these requests, special attention to individual problems is frequently necessary. Meeting these requests for special service or specific information is desirable inasmuch as it assures maximum utilization and application of the results of research.

The report "Retailing Prepackaged Meat," was widely reprinted in trade journals, and personnel of this Branch have been made available to give oral reports before national trade association meetings as well as meetings of small industry groups. Although this general report has well served the need of answering thousands of requests for information on this development, it did not attempt to solve specific problems now confronting retailers of prepackaged meat. These problems are: (1) how to reduce costs and increase the efficiency of various methods of packaging; and (2) how to alleviate the problem of rewinding prepackaged meats. Plans are now being made to carry out motion and time studies to develop increased efficiencies in the use of labor, machinery, and equipment in prepackaging meat in retail stores.

The manufacturers and suppliers of equipment for a self-service meat department have also used the material when rendering assistance to the owner or operator of a self-service meat store. Stores which have been in operation have used the data in making a comparison with their own operations. These data have also been used in various schools when training future store managers or workers.

IMPROVEMENT OF MERCHANDISING METHODS AND PRACTICES IN WHOLESALING AND RETAILING

The average cost of retailing food approximates 40 percent of the total cost of distribution. Only the cost of processing approaches the retailing function in cost, and for many food products it costs more to retail them than it does to produce them. The producer has a further important interest in the marketing of his product in the retail store because it is here that the consumers make their wants known with respect to quality, condition, quantity, grade, and packaging of food. Unless consumers purchase the producers' products, efficiencies in production and distribution go for naught, while on the other hand many inefficiencies in handling or merchandising may be discounted if an intelligent job of retailing is accomplished.

In 1949, there was in the United States, a total of about 370,000 independently owned and operated food stores handling 61 percent of the total grocery sales and about 26,500 chain stores handling 39 percent of the total sales. The retail food trade has been confronted by a series of problems caused by several trends that have been developing in the grocery field:

- (a) There has been a slow but steady increase of food sales made in the larger units and a corresponding decrease in the quantity of sales in the smaller units. According to data collected by the Progressive

Grocer, the independently owned stores with sales under \$100,000 had an average dollar loss in volume in 1949 of 2 percent. Stores with sales over \$100,000 had an average gain during the same period of 5 percent. However, even though retail sales appear to be slowly drifting to the larger units, small stores still have their place, and there are a considerable number of vigorous, healthy enterprises, many of which will develop into larger markets.

- (b) The trend toward self-service type of operation continued during 1949. The most recent development in self-service; i.e., self-service in the produce and meat departments, has continued to expand. In the past 10 years, self-service has expanded in independents that have participated in the Progressive Grocer annual survey from 13 percent of sales in self-service stores in 1939 to 64 percent of the volume in 1949. In 1949, it has been estimated that for both chains and independents, 67 percent of the sales are made in self-service stores, 18 percent in semi-self-service, and 15 percent in counter service.
- (c) There is closer and more effective wholesale-retail cooperation. Wholesalers have streamlined their operations, and through direct assistance or through group activity have assisted to a greater extent in getting merchandise into the hands of the retailers at a cost comparable to the chain organization. The wholesalers are also giving assistance to retailers in such activities as modernization, advertising, merchandising, and accounting.
- (d) Modernization and construction of food markets to take advantage of the latest designs developed and the steadily increasing population have continued at a relatively fast rate. Many stores enlarged their operation and changed from a service-type operation to semi-self-service or completely self-service when changing the physical structure of their stores.
- (e) More of the larger stores have been affiliating with voluntary and cooperative groups for the purpose of taking advantage of low-cost wholesaling operations.
- (f) All types of food stores have continued to add supplementary lines. An increasing number of stores added ice cream, candy, frozen foods, greeting cards, drug sundries, and a wide variety of household items. The addition of these relatively high-margin items made it possible for supermarkets to make a slightly higher total gross margin in 1949, even though their gross on food items was lower in 1949 than the previous year. Store operators have used the sale of nonfood items to reduce their cost of handling the food staples.

Only a very few of the large number of independently owned and operated food stores have the talent and resources necessary to do the research toward improving and adjusting their operations in line with the trends in retailing. As a result,

many stores are doing an indifferent job of retailing, and most of the improvements that have occurred have been the result of adopting practices first developed by chain store organizations. Agricultural research workers have an opportunity to indicate methods that may significantly lower distribution costs and/or increase the demand for food, because of the high cost and, in many instances, relatively inefficient practices in the retail stores. In the following pages some of the work being done by the Branch in this field is discussed.

Sale of Orange Concentrate through Mechanical Dispensers

The rapid increase in citrus production and the ability to distribute large quantities of frozen orange concentrate have made it desirable to discover an economic means of increasing citrus outlets of concentrate. Thus, a research project was undertaken to appraise the adequacy of various "counter-type" dispensers in the public feeding industry for dispensing pure orange juice (fresh frozen concentrate), especially with respect to the effects on sales of the orange juice.

The collection of data for the project was started December 1, 1949, and was completed May 31, 1950. Six stores of one chain were selected in each of two cities. Three machines (one of each type) were placed in operation in three of the stores for the first month. The other three stores were used as controls, using their old method of nonmechanical dispensing. At the beginning of each month for a period of six months, the machines were rotated throughout the complete pattern of the six stores.

Preliminary results indicate that the use of the dispenser substantially increased the sale of the reconstituted product. In stores where mechanical dispensers have been installed sales have immediately increased, but when the machine was removed on pattern rotation, sales returned to their former level. Upon re-installation, the sales again increased.

Laboratory tests have shown that the juice was being protected from contamination by the machines. High bacteria counts have occurred, but they have been attributed to carelessness of store personnel. Store managers and other personnel have accepted the mechanical dispensers favorably. They felt that there is greater efficiency and economy in serving juice by this method than by those previously used. Less handling, no loss through breakage, and faster serving time are a few of the reasons that were given for their preferring the new-type dispensers.

A report on the results of this project is being prepared and should be completed within three months.

Relation of Methods of Retailing Citrus to Quantity of Sales

The Branch has participated in a Southern Regional marketing research project on the marketing of citrus fruit. In addition to the Federal agencies, the University of Florida and the Texas Experiment Station have also cooperated on the study. This Branch was given the responsibility for studying three phases of the merchandising

problems confronting the industry. The objective of the work was to ascertain, through studies of changes in sales and demand for citrus fruits in response to different conditions, the consumer's reaction to different merchandising practices in retail stores.

1. Sales and consumer acceptance when priced by weight compared to count. Since its inauguration on the Pacific Coast in the late 1930's, retail pricing of oranges by weight has met with increasing acceptance in numerous retail stores throughout the Nation. The advantages offered by this method as compared with the long established count-pricing method have created considerable interest on the part of both retailers and customers.

An experiment was conducted in 38 stores located in 4 northeastern cities to ascertain the customer reaction to the 2 methods of pricing oranges. Two different methods of evaluation were used in the study. Supermarkets in Philadelphia, Hartford, and Boston maintained adjacent displays of both methods of pricing bulk oranges. All of these stores had previously priced their oranges by the count. Sales data showed that during the first week slightly over three-fourths of the store customers purchased their oranges by the method they were accustomed to; i.e., by the count method. During the second week this was decreased to about two-thirds, and the ratio of sales remained fairly constant for the remainder of the study.

To determine the effect of a change in pricing methods, 20 stores of the Somerville, Mass., area were divided into two groups and all Florida bulk oranges were sold by count-pricing in 10 stores and by weight in 10 other stores. Oranges priced by count accounted for 54 to 60 percent of total Florida orange sales in the 20 stores while the oranges priced by weight accounted for 40 to 46 percent of the total. These percentages were derived from sales records after compensating for the difference in volume of sales between the two groups of stores.

When interviewed as to their preference for buying oranges under one of the two pricing methods, 7 out of 10 customers stated a preference for count-pricing. The reasons as stated by the customers showed little consistency among the three cities where the questionnaire was used. "Economy" and "habit" were the most common reasons for customers preferring bulk oranges which were priced by the count; whereas, "economy" and "appearance" were the main reasons given for weight-pricing. About 90 percent of the customers who were interviewed selected each orange in the purchase irrespective of the pricing method.

2. Sales and consumer acceptance when sold in bags compared to bulk. The citrus industry has been doing considerable experimenting with selling oranges in consumer-sized bags. There is also a considerable difference of opinion as to whether this practice is acceptable to the consumer and as to whether the citrus is more acceptable in the transparent film bag or the open-mesh bag. This project was designed to ascertain the consumer acceptance of bagged oranges compared with selling them in bulk, and to help ascertain the relative merits of the two types of bags.

Data have been collected in 24 stores located in 3 sample cities by the use of special inventory records, and on consumer preferences by personal interviews with

customers who purchase citrus. These data are being analyzed, and a report is being prepared on the results.

3. Sale and consumer acceptance when sold in small consumer bags compared to large consumer bags. The industry's extensive use of consumer bags has also raised the question as to the best size bag to use. The study was designed to determine the differences in sales and consumer preferences for 4-, 5-, 7-, and 8-pound bags of Florida oranges. Data were collected in three cities from six stores located in each city. These data are currently being analyzed, and a report is being prepared on the results.

Selling Textile Products in a Retail Food Supermarket

A chain of 21 food supermarkets in one city put in a line of hardware, home appliances, and textiles in 2 of the organization's new outlets. It was suggested that a study be made to evaluate the sale of textiles in the 2 supermarkets. It was merely a pilot study for the purpose of determining the feasibility of doing research on the selling of textiles in food supermarkets.

Information on the operation of the stores was obtained from studying the stores' operating statements, their purchasing methods, warehousing operations, pricing practices, rate of turnover, overhead costs, etc. All of these factors were then analyzed insofar as possible in relation to other standard measures used by the Controllers' Congress of the National Retail Dry Goods Association. The officials of the company operating these stores viewed the operations as strictly experimental. The operations started as a self-service operation and, as the experiment proceeded, it was found desirable to revert to the conventional department store basement-type of service operation.

The firm decided to discontinue all of the "Home Service" lines except textiles. Inasmuch as this was a new operation to the organization, many mistakes were made that were rectified in the course of the experiment. The top management of the organization is still not convinced that this addition to its food market is going to be a success. The Department is continuing to follow the operations of the organization.

No formal report will be issued because of the inconclusiveness of the results. Based on the results and information obtained from this pilot study, it appears that if any further research is desired in the retailing of textiles, its scope should be redefined.

TRANSPORTATION FACILITIES, EQUIPMENT, AND LOADING METHODS

The transportation research of the Branch during the fiscal year has been carried on in three general fields: (1) Better utilization of equipment, (2) improvement of transportation equipment, and (3) research into methods of loading, bracing, and shipping agricultural commodities.

THE PRESENT TRANSPORTATION SITUATION

Railroads continue to haul a greater total volume of agricultural tonnage than their competitors. However, in the case of some individual commodities, such as livestock and eggs, the volume transported by motortrucks exceeds that hauled by railroads. There has been an increasing movement of fresh fruits and vegetables by motor vehicle since the end of World War II. It is now estimated that the trucks transport approximately one-half of the total volume of intercity traffic and movement of these commodities from the producing areas to final markets. With a continuing high level of production and consumption of goods of all kinds, an increasing diversion of railroad traffic to truck lines is reflected in the decline in total tonnage of the railroads over the past several years.

Railroads

Our report for the fiscal year 1949 pointed out that total carloadings of the railroads during the latter half of the fiscal year were approximately 9 percent below the same period of 1948. Total railroad carloadings since January 1, 1950, have averaged approximately 6.5 percent below those of the comparable period in 1949. Data on the movement of all agricultural products during the first six months of 1950 are not yet available, but three of the volume commodities, grain, livestock, and fresh fruits and vegetables averaged 8 percent below last year.

The decline in railroad traffic has eased the demand for box, refrigerator, and livestock cars, which demand during the postwar years contributed to the acute car shortages experienced in that period. This does not mean, however, that there have been no car shortages during the past year, nor that they may not become serious again. The number of worn-out cars retired and a larger than usual number of unserviceable cars exceeded new replacements and cars reconditioned. As a result, fewer cars were available for use than in the preceding couple of years. The effect of decreased traffic, together with efficient national distribution through the Car Service Division of the Association of American Railroads has reduced the incidence of shortages and lessened the degree of their severity.

As an indication of the continued decline in numbers of new cars being built, the number on order as of May 1, 1950, was 31,748 compared with 57,429 a year ago and 103,896 on order January 1, 1949. The total number of refrigerator cars in operation has now dropped to 128,250 compared with approximately 146,000 at the beginning of World War II and 131,500 a year ago.

Motortrucks

In contrast with the decrease in numbers of railroad cars is the increase in the number of trucks serving agriculture and engaged in the intercity movement of products. The Bureau of the Census reported 1,095,000 trucks on farms in 1941; preliminary estimates indicate 2,200,000 on farms as of January 1, 1950, an increase of 100 percent.

Over-all truck transportation capacity has also increased rapidly during the post-war years as shown by the rise in truck registration reported by the Bureau of Public Roads, Department of Commerce. On January 1, 1950, there were 7,692,569 private and commercial trucks registered in the United States compared with 4,513,340 on January 1, 1945, and 4,590,386 at the beginning of 1941.

Steadily increasing marketings of agricultural commodities by motortrucks are reflected by the following data based upon reports of the Market News Service of receipts at terminal markets where both truck and rail arrivals are recorded. Percentages are of combined rail and truck receipts.

<u>Commodity</u>	<u>Percent moved by motortruck in:</u>	
	<u>1949</u>	<u>1948</u>
Fresh fruits and vegetables	50	45
Livestock	72	69
Live poultry	99	98
Dressed poultry	69	56
Butter	56	44
Eggs	85	64

Water and Air Transport

Inland, lake, and coastwise facilities for the bulk movement of agricultural commodities and fertilizer are available to meet all peacetime needs. However, there is less package freight moving by water now than before World War II. The principal factors in this situation are the greatly increased costs of transfer between piers and vessels and the high initial costs of replacing package vessels requisitioned from coastwise and lake lines during the war.

Air transportation of agricultural commodities is mostly confined to flowers and specialty and luxury food items. The volume, although relatively small, is growing, and research into pertinent phases of air transport in the agricultural field has been recommended for the consideration of the Department by the Transportation Advisory Committee.

UTILIZATION OF CARRIER EQUIPMENT

Schedules and Performance of Carriers

The agricultural industry is interested in promoting greater efficiency in the utilization of railroad equipment employed in transporting farm products. First,

agriculture depends upon a sound and progressive national transportation system; secondly, the type of equipment must be provided which is best suited for moving seasonal agricultural commodities, especially perishable products; and third, suitable equipment must be made available at the time and place needed during short harvest seasons.

More frequent use of the same car is essential to obtain greater efficiency in utilizing railroad equipment. Progress toward this objective should diminish the need for the railroads to invest in additional equipment with the attendant expenses of amortization, interest, and taxes. A faster transit time speeds delivery of the shipment, thereby releasing the car earlier for its re-use by another shipper and reducing the turn-around period.

In recent months many individual railroads, by independent action, have expedited freight service. The opportunities to make impressive showings will vary among the railroads due to dissimilarities in the character of traffic, the comparative distances between principal competitive points, and other variations in operating conditions. Railroads possess the facilities and ability to render an expedited service. However, this course presents problems to both the employees and the management of each large system. Best solutions will be found by a realistic or candid appraisal by each railroad of its own freight service from the viewpoint of the shipper and receiver. The Standard Interstate Commerce Commission operating performance averages are inadequate for measuring the service elements of special interest to railroad patrons. For example, increases in "gross ton-miles per train-hour" indicates that longer trains run faster between termini. However, the unit fails to disclose that many carload shipments in such longer and faster freight trains are held over at terminals while accumulating a train load. Statistics of this type have persuasive influence upon operating policies and practices. Unless a counterbalancing "quality of service" unit is correlated with standard operating averages, the operating efficiency indices may be overemphasized. The viewpoints and needs of railroad customers should be considered.

Fundamentally, research on this subject is conducted by the Branch from the viewpoint of the shipper or the receiver. Accordingly, and as an aid to the railroads, the Branch developed a statistical unit for measuring the quality of freight service rendered. The unit may be used to indicate the effect of operating policies and practices upon the quality of service. The unit, which might be called a "Movement Ratio," lends itself to correlation with certain standard operating performance averages.

The "Movement Ratio" formula was applied to 36,000 sample carload movements of agricultural commodities. The results are indicative rather than conclusive. In a forthcoming report it will be recommended that each of the railroads employ the formula, or a modification thereof, to the carload shipments over its line.

Upon the recommendation of the Transportation Advisory Committee the above described survey and analysis of railroad schedules and performances recently was expanded to include typical movements of citrus fruits and frozen concentrate from Florida to northern markets. The Florida Growers and Shippers League and citrus

processors are cooperating in furnishing basic data. The collection of pertinent information and data has been under way since midway of the fiscal year. A record currently is being compiled to provide a complete history of carrier performance in the movement of these products from Florida to New York, Pittsburgh, and Chicago markets. As the pattern of data progressively becomes firmly crystalized, the survey and analysis will be extended to cover similar movements between other sections of the United States. Time in transit already has been found to be very important to the movement of the frozen citrus concentrate product. If the equipment used in transporting this new type of product is such that it permits the temperature to rise during a long transit time, significant damage to the concentrate may result. Upon completion of the analysis of these data the problem will be taken up with the carriers involved for improvements in the service as may be found to be necessary.

Effect of Lack of Reciprocal Switching Arrangements on Movement of Farm Products

A study was made of the effect upon the movement and distribution of agricultural products in Baltimore and Philadelphia resulting from the lack of reciprocal switching arrangements and absorption of switching charges by competing railroads in these two cities. The Interstate Commerce Commission has endorsed the principle of reciprocal switching as being sound and progressive. It is employed throughout the country except in a small area in the highly industrialized East. The excepted area is generally east of a line from Buffalo southward through Pittsburgh to Clifton Forge, Va., thence north of and along the Chesapeake and Ohio Railroad to Norfolk, Va.

The study disclosed that in almost all instances the shippers and receivers of agricultural products were able to avoid payment of switching charges by routing their shipments, but at some inconvenience, over the line that directly served the plant or facility in Baltimore or Philadelphia to which the shipment is destined, or from which it is forwarded. It was further found that most of the present difficulties in these two cities resulted from duplicate market facilities constructed by each railroad to handle products transported by them. The inconvenience and added expense by reason of such split-market situations in distributing perishable agricultural commodities marketed in Baltimore and Philadelphia are more pressing at this time than the lack of reciprocal switching. Completion of consolidated wholesale produce market facilities, for which proposals and plans are currently being considered, would alleviate most of the inconveniences and expense attributed to failure of the line haul railroads serving these cities to absorb each other's switching charges.

IMPROVEMENT OF TRANSPORTATION EQUIPMENT

The development of new products, increases in the cost of labor and materials, coupled with lower farm prices of some commodities, the increasing importance of marketing products in wholesome and attractive condition, and competition between different modes of transportation, have given impetus to the search for better rail and motortruck equipment so that delivery of produce from farms and orchards may be made in the best possible condition. The increasing use of materials-handling

equipment to save labor costs has presented additional problems in the adaptation of transportation equipment to the effective use of new developments in that field. Work has been done in connection with a variety of different kinds of transportation equipment to meet one or another of the conditions mentioned.

Railroad Refrigerator Cars

The railroad refrigerator car, improved in various respects over the past 100 years, has made possible the tremendously increased production and consumption of fresh fruits and vegetables and many other perishable food items. In certain respects, however, even the latest and most improved types of standard refrigerator cars, using water ice and salt as a refrigerant or portable heaters for protection against cold, have certain limitations. One of these limitations is the inability to produce and maintain sufficiently low temperatures (approximately zero) which shippers of the newly developed frozen foods insist are necessary to give proper protection to the commodity. Another weakness is the carriers' inability to control temperatures in the standard refrigerator car with sufficient exactness and certainty. Increased interest has been manifested in the adaptation of mechanical refrigeration and heating techniques to a refrigerator car. Very few of these mechanical cars have been built for experimental purposes, and in order to determine the practicability and economy of such cars in the transportation of agricultural commodities the Branch selected one for study. Figure 5 is a schematic drawing of this car which, together with the following explanation, will illustrate the main features of its construction and operation.

The refrigerating and heating system consists of two completely self-contained units located at one end of the car. Each unit is mounted on a frame which has a sliding arrangement that permits the entire unit to be drawn out the side of the car and removed for repair or replacement, or if it is considered that only one unit is necessary for the performance of the refrigeration and heating function required for a particular movement. After placement in the position indicated in the accompanying sketch, the unit is firmly locked in place, and an exhaust generator is lowered and clamped to the top of the unit for removal of fumes and heat from the engine section.

The controls are automatic but are arranged so that only one unit will operate when the refrigeration requirement falls within the capacity of one unit to handle it adequately. If the refrigeration load should be increased beyond the point where one unit can handle it alone, the second unit automatically cuts in to furnish the necessary additional capacity. The second unit will also take over automatically should the first unit fail in operation.

An additional feature is the reverse cycle heating system wherein the refrigeration system is used to provide heat. If for any reason the temperature in the car should fall below that for which the thermostat control is set the units will operate on the heating cycle. It is constructed to maintain constant commodity temperatures in instances where the load travels from one climate to another.

Electric battery-powered air-circulating fans are provided to assist in maintaining uniform temperatures through the car. When the units, which have their own

air-circulating fan, stop operation the auxiliary fans start automatically. The units are powered by gasoline motors, the fuel being supplied by two 155-gallon capacity tanks located under the car. Tests indicate that this is more than an ample supply for a cross country trip. The batteries are kept charged by the generators in the unit.

Approximately 20 test runs have been made in the United States on two of which U. S. Department of Agriculture personnel made official observations. The results of these tests have indicated the ability of the car to provide temperatures ranging from below zero to 70 degrees within the range of climatic, sectional, and seasonal conditions in the United States. They also indicate that temperatures may be held in the car within the range of a very few degrees of the temperature for which the thermostatic controls are set, whether heat or cold is to be provided.

During the fiscal year an appraisal was made of the several kinds of refrigerator car equipment in common use and in the experimental stage, including the standard refrigerator car, types utilizing dry ice and dry ice with water ice as a secondary refrigerant, an experimental car employing the split-ammonia system, and the mechanical refrigerator car. A report on this project is in preparation at the close of the fiscal year.

Motortrucks

The increasing volume of movement and the great variety of types of trucks now used for the transportation of agricultural commodities have given rise to demands for research having as its purpose the determination of the proper features that should be incorporated into truck and trailer design and the methods of application of the various types of refrigerating media that will give maximum performance and protection to the commodity at a minimum cost to the producer and to the carrier. The Branch, in cooperation with the United Fresh Fruit and Vegetable Association, the American Trucking Association, and the Truck Trailer Manufacturers' Association, has undertaken a study of truck transportation of perishable commodities. Work so far has been limited to the collection and tabulation of data now available from various sources on motortruck and trailer construction, specifications, and performance. Information as to the latter is meager. Data have also been obtained from the industry dealing with the characteristics of private truck equipment now in use. Actual observation of truck shipments and test runs will be begun after the beginning of the new fiscal year.

Improved Railroad and Truck Equipment for Movement of Frozen Foods

The rapid expansion in the production of frozen foods has emphasized the need for improved transportation equipment capable of providing zero temperatures insisted upon by shippers for protection of the commodity. These products are moved both by railroad and motortruck. A large quantity of frozen foods, for lack of storage capacity at the processing plants, is shipped promptly to storage warehouses in other parts of the country for storage and subsequent distribution to wholesale and retail outlets. The transit period is especially critical because a rise in the temperature of the commodity during that time is difficult to recover during storage.

— KEY —

- | | |
|--------------------------|---------------------------|
| 1 UNIT NO. 1 | 13 ENGINE SECTION HOUSING |
| 2 UNIT NO. 2 | 14 CONTROL BOX |
| 3 CRADLE AND CLAMP ASSY. | 15 TELESOPING LADDER |
| 4 EXHAUST HOOD | 16 SLIDING DOOR |
| 5 EXHAUST FLUE | 17 DOOR LIFT CRANK |
| 6 EXHAUST CAP | 18 FUEL TANK |
| 7 COLD AIR DUCT | |
| 8 OUTLET AIR DUCT | |
| 9 INLET AIR CHAMBER | |
| 10 BATTERY BOX | |
| 11 THERMOMETER | |
| 12 AIR RETURN GRILLE | |

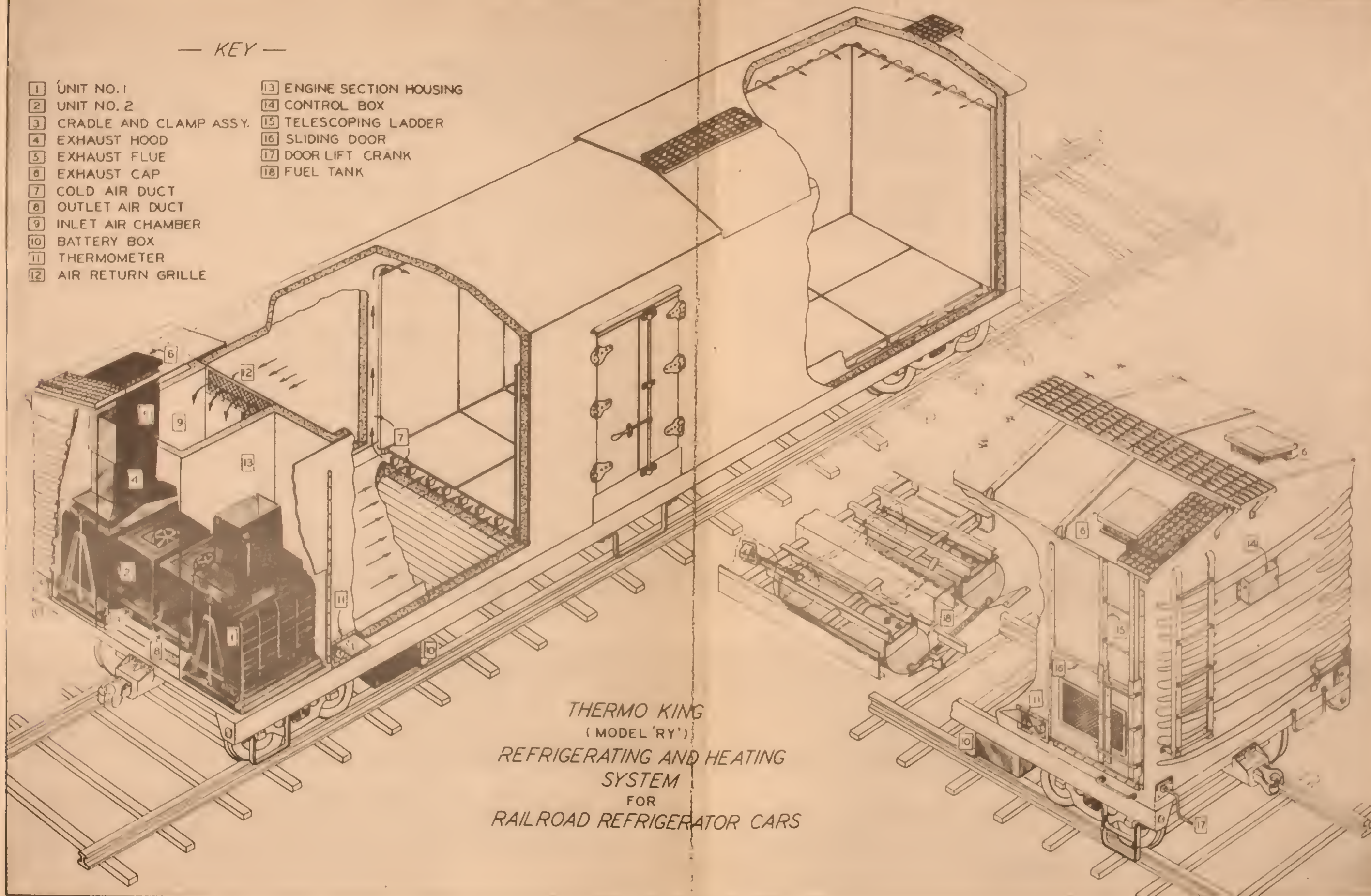


Figure 5.--One type of refrigerating and heating system for refrigerator cars.

In January of this year, members of the Branch were called to attend meetings with representatives of the railroads, private refrigerator carlines, motortruck carriers, and processors to deal with this problem. These meetings were held in the offices of the Interstate Commerce Commission in order to assist the Commission in determining the facts related to approval of temporary operating authority of a number of motor carriers which had application pending. After consideration, the Interstate Commerce Commission issued an order dated March 9, 1950, approving temporary authority to certain of these motor carriers. However, there was a restriction in the order which read as follows:

Service is not authorized to any consignee, warehouse or storage facility located on rail siding and having capacity for handling 36,000 pounds or more of frozen citrus juice concentrate.

This clause would have restricted the motortruck carriers from serving the principal receivers in the cities to which the major portion of the concentrate is shipped. Representations were made by the Department and the industry protesting the restriction and it was rescinded by the commission shortly thereafter.

Because the temperature requirements for the transportation of frozen foods were more exacting than have heretofore been necessary for other foods, it was considered advisable to undertake a special program to determine the relative abilities of various types of equipment to meet these requirements.

This program will first consist of tests and experimentation on shipments of concentrate, both by railroad refrigerator cars and refrigerated trucks, in order to determine the type of refrigeration, amount and quality of insulation, and methods of application of refrigerant which give the best results at the lowest cost. When these are completed, the tentative conclusions will be checked with experiments on other commodities. Twelve tests have been conducted on various types of truck equipment and five railroad shipping tests have been run. In each railroad test various types of equipment including the mechanical cars were used in order to permit a comparison of their relative efficiencies. The tests were held during the last quarter of the fiscal year and the data with respect to relative temperatures, fuel consumption, and other factors are being analyzed for the preparation of a report in the early part of the new fiscal year. The Interstate Commerce Commission has requested that data be made available as early as possible. These tests are to be followed by others at various periods throughout the coming year so that data may be obtained on performance in all kinds of weather and under all types of conditions.

More Efficient Transportation of Grain

Periodic shortages of box cars experienced over the past few years have been particularly serious with regard to the better class of equipment that is required for the protection and shipment of grain. In order to minimize the shortage of such equipment it is necessary not only that it be handled expeditiously by the carriers but that it be promptly loaded and quickly unloaded at destination. This is especially important during the harvest periods of the major grains when congestion

of cars at terminals takes place due to the inability of terminal elevators to unload the grain as fast as it is received. Not only is this responsible for delaying the return of cars to the grain producing areas, but it has caused the carriers on several occasions to apply embargoes against grain consigned to the markets. There are also some indications that the cash price for grain received by the farmers is affected by such market congestion.

The common method of transporting grain is in a box car with protective lumber nailed across the car doors to a height above the level of the load (called grain doors) to prevent the pressure of grain against the car door and consequent leakage around the door itself. When the car arrives at a terminal elevator, it may be unloaded by means of an automatic car dump--a special piece of machinery that tilts the car on its side and from end to end so that the grain may run out the doorway into the pit below the tracks, from which belt conveyors move it to the elevators. An automatic car dump is usually found only in the larger elevators where a considerable and steady volume of grain is handled. Most elevators do not have such equipment, principally because of the original expense of the machinery and installation.

When elevators do not have an automatic car dump, the usual method of removal of the grain is by a scoop pulled by a cable which is attached to a power-operated winch. After as much of the grain as possible is moved by the scoop, the remainder is shoveled and swept out of the car. This operation is much slower, and its labor costs are higher.

Upon the recommendation of various industry advisory committees a study was begun into the equipment and methods used for the transportation of grain to endeavor to develop more efficient and economical means of handling, either by adaptation of present equipment, development of new types of equipment or facilities, or the application of different methods than are now used.

Preliminary work has included the assembly of a considerable volume of information about the existing facilities, both of railroad cars and elevator equipment, including methods of loading and unloading. Data have also been obtained on experimental types of railroad cars that have been developed in the past, including covered hopper cars. The work is being conducted in cooperation with the grain trade, with representatives of associations of country elevators, cooperative terminal elevators, and private terminal elevators participating. As it progresses, representatives of carriers and railway equipment manufacturers will be invited to take an active part.

IMPROVEMENT OF LOADING, BRACING, AND SHIPPING OF PERISHABLE AGRICULTURAL COMMODITIES

As a result of greatly increased marketing costs in recent years, considerable attention has been directed to the important problem of reducing the excessive waste and spoilage associated with the marketing and handling of many perishable and fragile agricultural products. Some waste, spoilage, and damage occurs at nearly every point in every marketing channel through which the commodities pass on their

way from the field or orchard to the consumer's table. Although the direct costs of this waste and spoilage are borne by the various marketing agencies that handle the commodities, they are indirectly borne by producers and consumers as a result of the increased marketing charges necessary to cover the costs of such waste. The costs of this waste and spoilage are, therefore, ultimately reflected in increased costs of the commodities to consumers and/or lower returns to producers.

The data on claim payments for loss and damage during transportation by Class I railroads in 1948 as compared with 1939, presented in table 1, indicate the relative magnitude of the cost of part of the damage accruing to railroads as only one type of transportation agency in the marketing system. Although part of the claims paid during 1948 covered traffic moved in previous years, the net increase in the cost of this damage as compared with previous years is very substantial. In the case of shell eggs, for example, the railroads in 1948 paid out in damage claims \$21 for every \$100 in freight revenue received for hauling this commodity. Preliminary reports indicate that damage claim payments for shell eggs in 1949 will reach an all-time high of \$145 per car.

A very substantial part of this loss is associated with the transportation of these commodities between shipping point and terminal market. Many commodities must be transported distances ranging as high as 3,000 miles under all types of handling and weather conditions. In addition to the normal damage hazards associated with rail and truck transportation of various commodities, rough handling or treatment received by some shipments in transit produces excessive damage. This in-transit damage is further supplemented by that occurring in loading and unloading operations.

The primary result of these damage hazards and handling conditions is broken, racked, weakened, and demolished containers, with consequent spilling, cutting, bruising, or contamination of their contents. (See figs. 6 and 7.) Shifting and disarrangement of loads in transit as a result of rough handling or improper loading or bracing will also block ventilation and refrigeration channels and produce a maldistribution of top or body ice in the load, thereby contributing to improper refrigeration and deterioration of the commodities. It is recognized that the unfavorable conditions of temperature and humidity to which many perishable commodities are exposed in transit and relatively light surface injuries or bruising, much of which may not be detectable at the time shipments are unloaded, will result in spoilage in subsequent marketing channels or at the consumer level.

A comprehensive program of research work aimed at reducing the excessive loss and damage now associated with the transportation and marketing of perishable and fragile agricultural commodities is carried on by the Branch. The objectives of this work are the development of more efficient and economical types and methods of loading, bracing, handling, and transportation of agricultural perishables and securing the adoption of the most efficient of these devices by transportation agencies and the trade. Part of the work is performed directly by Branch personnel, while certain other portions or phases of the work are carried out under contract. This work is carried on with the cooperation and participation of growers, shippers, packers, transportation agencies, and trade associations.

Table 1.--Loss and damage per car for selected representative commodities, 1939 and 1948 ^{1/}

Commodity	1939		1948		Percentage increase per car
	Total	Per car	Total	Per car	
	carload loss and damage	loss and damage	carload loss and damage	loss and damage	
	Dollars	Dollars	Dollars	Dollars	
Tomatoes	275,883	9.74	2,012,725	81.65	738.3
Honeydew melons	99,773	22.22	356,389	77.07	246.8
Peppers	17,758	14.71	188,243	77.02	423.6
Cantaloups	203,028	15.41	1,622,825	73.38	376.2
Cucumbers	50,903	16.18	189,433	64.45	298.3
Peaches	133,228	6.65	1,067,611	63.89	860.8
Plumes and prunes	80,358	12.85	388,368	54.21	321.9
Turnips	1,533	3.39	18,149	42.70	1,159.6
Pears	60,114	3.72	455,464	39.47	961.0
Watermelons	270,937	15.33	1,081,416	38.89	153.7
Grapes	379,548	11.95	1,019,152	36.89	208.7
Carrots	141,518	10.42	796,073	32.74	214.2
Cauliflower	45,532	5.95	293,024	30.62	414.6
Celery	115,237	5.83	655,690	26.40	352.8
Oranges	286,933	4.30	2,038,994	25.06	482.8
Lettuce	416,678	7.95	1,764,917	24.02	202.1
Apples	193,835	3.79	897,136	23.31	515.0
Spinach	24,067	3.81	66,173	22.77	497.6
Lemons	54,633	2.69	316,339	20.56	664.3
Grapefruit	76,127	2.64	483,387	15.81	498.9
Mixed vegetables	115,473	4.30	459,070	14.20	230.2
Cabbage	86,947	4.64	288,833	12.16	162.1
Onions	53,390	1.93	345,001	11.78	510.4
Potatoes (sweet)	20,329	2.37	89,473	11.27	375.5
Potatoes (white)	186,486	.99	1,465,588	4.86	390.9
Bananas	59,053	.72	286,681	3.11	331.9
Eggs (shell)	135,201	4.88	1,933,060	90.23	1,749.0
Fresh and cured meats	232,401	.69	1,829,758	5.09	637.7
Total	3,816,903		22,408,972		^{2/} 495.7

^{1/} Annual Reports of Freight Claim Division, Association of American Railroads, 1939 and 1948.

^{2/} Percent of increase in total.



Figure 6.--Doorway view of a carload of carrots showing heavy damage from shifting of the load.



Figure 7.--Interior view of part of a carload of dressed beef showing several "down" quarters on car floor.



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A total of four reports were prepared for publication during the year on this work. Two of these reports have already been released, while the remaining two were being processed for publication at the end of the fiscal year.

Transportation of Peaches in Bushel Baskets and Wirebound Boxes

Detailed observations were made at several different packing plants in South Carolina during the 1948 and 1949 seasons on bruising, in-transit temperature records, and other important aspects on about 100 cars of fruit packed in two different containers--bushel baskets and wirebound boxes. Information concerning the spoilage of fruit handled in the two containers was checked after it reached retail stores, and in-transit damage and load failures were also obtained. It was developed that both bushel baskets and wirebound boxes of peaches could be loaded 4 layers high instead of the present 3 layers without any additional increase in damage and, in most instances, without a significant decrease in efficiency in refrigeration of the commodity during transit. Use of this 4-layer-high load, it was found, would result in direct savings of re-refrigeration costs to shippers of about 5 cents per package or \$27 per car on shipments from South Carolina to major terminal markets in the East. An analysis of cost data furnished by the Interstate Commerce Commission revealed that the direct savings in haulage costs to the railroads that would result from the use of 4-layer loads, part of which could be returned to the shipper, would amount to as much as \$84.70 per car on shipments of peaches in baskets from Macon, Ga., to New York City.

A report on this study entitled, "A Comparative Study of Packing, Transportation, and Refrigeration Costs of Bushel Baskets and Wirebound Boxes for Transportation of Peaches," was released in February 1950.

Transportation of Citrus Fruit in Multiwall Bags and Wirebound Boxes

A study of the relative merits of the multiwall paper bag and the wirebound box for transportation and marketing of citrus fruits was made, and a report for administrative use only was issued on the findings in January 1950.

Improved Loading and Bracing of Shell Eggs

The findings of a detailed study of in-transit damage in 1,680 carloads of shell eggs unloaded in 41 terminal markets are covered in a report entitled, "Reduction of Loss and Damage in Rail Transportation of Shell Eggs by Improved Loading and Bracing," which was sent to the processors by the end of the fiscal year. This research revealed that damage during transportation due to faulty loading methods could be reduced as much as 60 percent by eliminating all lengthwise slack in the loads before shipment. It was also found that 5-layer-high loads of this extremely fragile commodity showed about 50 percent more damage than the 4-layer-high loads.

Relative Importance of Different Factors in Transportation Damage to Watermelons

A study was made of the relative importance of several different factors in transportation damage. The commodity chosen was watermelons, and observations were made of 17,000 carloads shipped from all major producing areas in the country. The study revealed that the Black Diamond or Cannon Ball variety suffers less damage in transportation than any other commercially important variety of melon. It was also found that shipments of melons with hay or straw cushioning on the end walls of cars suffered about 10 percent more damage than shipments in which excelsior pads were used for end wall padding. A report was in the processing room by the end of the fiscal year.

Other Loading, Shipping, and Handling Studies

Studies on the improvement of loading, bracing, and handling of various commodities were made during the year under contract with several organizations. A comprehensive program of field, laboratory, and transcontinental shipping tests was inaugurated by the Research Department of the Western Growers Association. This Branch has administered and supervised a program of work carried out under this contract and is now engaged in analyzing the data furnished by the contractor.

The objectives of the work conducted under this contract during the year were the development of improved loading and transportation methods for lettuce and carrots. Initiation of this research has resulted in a year's postponement of an order by the Interstate Commerce Commission reducing the bulge allowance on crated lettuce from 2-1/2 inches and on carrots from 2-3/16 inches to 1-5/8 inches for each. Preliminary results of shipping tests revealed that the use of a single strand of wire around the middle of standard lettuce crates reduced breakage in transit by almost half. It is estimated that the use of this device would eliminate about \$350,000 worth of in-transit damage yearly.

Tentative indications obtained from test shipments utilizing a new container developed by the industry, are that it suffers less in-transit and unloading breakage than the conventional crate and that the lettuce packed in it incurs less bruising and crushing. Observations of the effect of various amounts of ice used in packages of lettuce were made under controlled test conditions for periods comparable to the normal transit time from west coast to east coast points, and are being followed by actual transit tests to obtain confirmation of preliminary results.

During the year a total of over 100 transcontinental test shipments and 12 laboratory holding tests were completed. These involved detailed studies of the effects of loading patterns, container arrangement, types and methods of bracing employed, amount of top ice on loads, the effectiveness of different quantities of pack ice, and the effect of different methods of loading and unloading employed. It has been found that much of the breakage of containers previously thought to have occurred in transit was the result of handling in unloading operations. Special shock recording instruments or impact registers have been used in most test shipments, and considerable data regarding the type and severity of handling received by

the test shipments have been developed and are currently being analyzed. Preliminary evaluation of the data indicates that substantial savings may follow adoption of methods developed through this program.

During the latter part of the year this contract was amended to extend this type of research to the handling and transportation of other commodities.

Work under two contracts, one with the Railroad Perishable Inspection Agency and one with the Western Weighing and Inspection Bureau, negotiated during the previous year was completed during the current year. Detailed data regarding the type and relative amounts of loss and damage associated with the use of different types of containers and loading and bracing methods used in rail shipments were collected on 44,000 carloads of various commodities shipped from all major producing areas throughout the country and unloaded in 26 terminal markets.

Another contract with the Railroad Perishable Inspection Agency, also completed during the current year, resulted in the collection of data on the relative amounts of "down" beef in carload shipments associated with different loading patterns, methods of hooking quarters, type of refrigerator cars, and variations in railroad routing. Most of the data collected under these contracts have been consolidated and analyzed, and several reports based upon the information developed were in various stages of preparation at the end of the year. This work will be continued during the coming year.

A contract providing for several hundred shipping tests on refrigerator carloads of dressed beef and shell eggs was negotiated during the latter part of the year with the North American Car Corporation. The objectives of this work are to determine the relative amounts of damaged and "down" beef and breakage of eggs associated with different degrees of end-to-end shocks and vertical vibrations transmitted to loads of this commodity during rail shipment and to what extent it can be eliminated through improved running gears on refrigerator cars. Special two-way ride recording instruments are placed in all test shipments made from the plants of several meat and egg packers in the Midwest to several eastern markets, and detailed inspections are made at both shipping point and destination. This program of shipping tests will be continued during the coming year.

Some preliminary investigations were made during the year to lay the ground work for a new program of research to determine the feasibility of adapting the palletized and unitized methods of loading and transporting a number of agricultural products. The handling of many non-agricultural commodities and processed food products has been greatly facilitated and the costs of these operations substantially reduced in recent years by the use of palletizing and unitizing of packages to make them adaptable to mechanized handling and reduce damage. The purpose of this study is to determine the possibility of using these pallets and unitized packages during the process of transportation, since these types of materials-handling equipment to date have been used largely in handling before and after the transportation takes place. It is thought that the possibilities of reducing handling costs would be materially increased if unit loads and pallets could be used from the point of origin through the process of transportation, warehousing, and wholesaling to a

point as near as possible to the ultimate consumer. The possibility of using such equipment during transportation is the phase of a subject that has not been properly explored. It is anticipated that work in this field will be undertaken as soon as conditions with respect to funds and personnel permit.

PROGRAM DEVELOPMENT IN MARKET NEWS, STANDARDIZATION, AND GRADING

Three lines of work were carried on during the year aimed at modernizing and improving the Department's service programs on market news and grading with the end view of facilitating the handling of farm products through private marketing channels and thus to create additional outlets. The objectives of these lines of work were: (1) To improve the effectiveness of wholesale market news, (2) to explore the possibilities of developing a useful retail market news service, and (3) to study the adequacy of grades and standards for farm products.

Most of the Department's market news and grading programs were established 30 to 40 years ago, and marketing practices have changed substantially since then. Mass merchandizing, trucking, increased use of telephone and teletype, the growth of large-scale distributor and procurement agencies, and the obsolescence of many of the terminal market facilities--all have had their effect on the methods of marketing farm products and the conditions under which they are marketed. For the Department's market news and grading programs to make their best contribution with the funds appropriated by Congress, they must change and develop in line with marketing changes. To determine what these changes should be and how to make them is the purpose of the work that was done during the year. This work is being continued.

IMPROVEMENT OF THE EFFECTIVENESS OF WHOLESALE MARKET NEWS

Program for Development of the Market News Service

Special attention was given during the year, in cooperation with the Office of the Administrator and the six commodity market news services--cotton, dairy and poultry, fruits and vegetables, grain, livestock, and tobacco--to the preparation of a program for development of the Market News Service of the U. S. Department of Agriculture. This program includes an over-all appraisal of the present services now provided by market news, the features that need strengthening, and the additional services needed. It brought out the lack of market news information at the retail level and the need for (1) increased market news reporting in country producing and shipping areas; (2) the reporting of truck movement and increased reporting of truck receipts; (3) market news reporting of fruits and vegetables for processing; (4) improvements in the dissemination of information; (5) relief reporting; (6) market news on naval stores, fats and oils, and molasses and sirups; and (7) technical coordination of the Market News Service. The present basis for sharing expenses between Federal and State Governments was reviewed and a new basis recommended for uniform cooperative financing that would fit the potential change and growth in the service.

Development and Testing of Methods of Reporting Prices for Butter Received by Creameries

At the request of the Iowa creameries through the Iowa Creameries' Association, a pilot study was undertaken to develop a report that could be used by them in

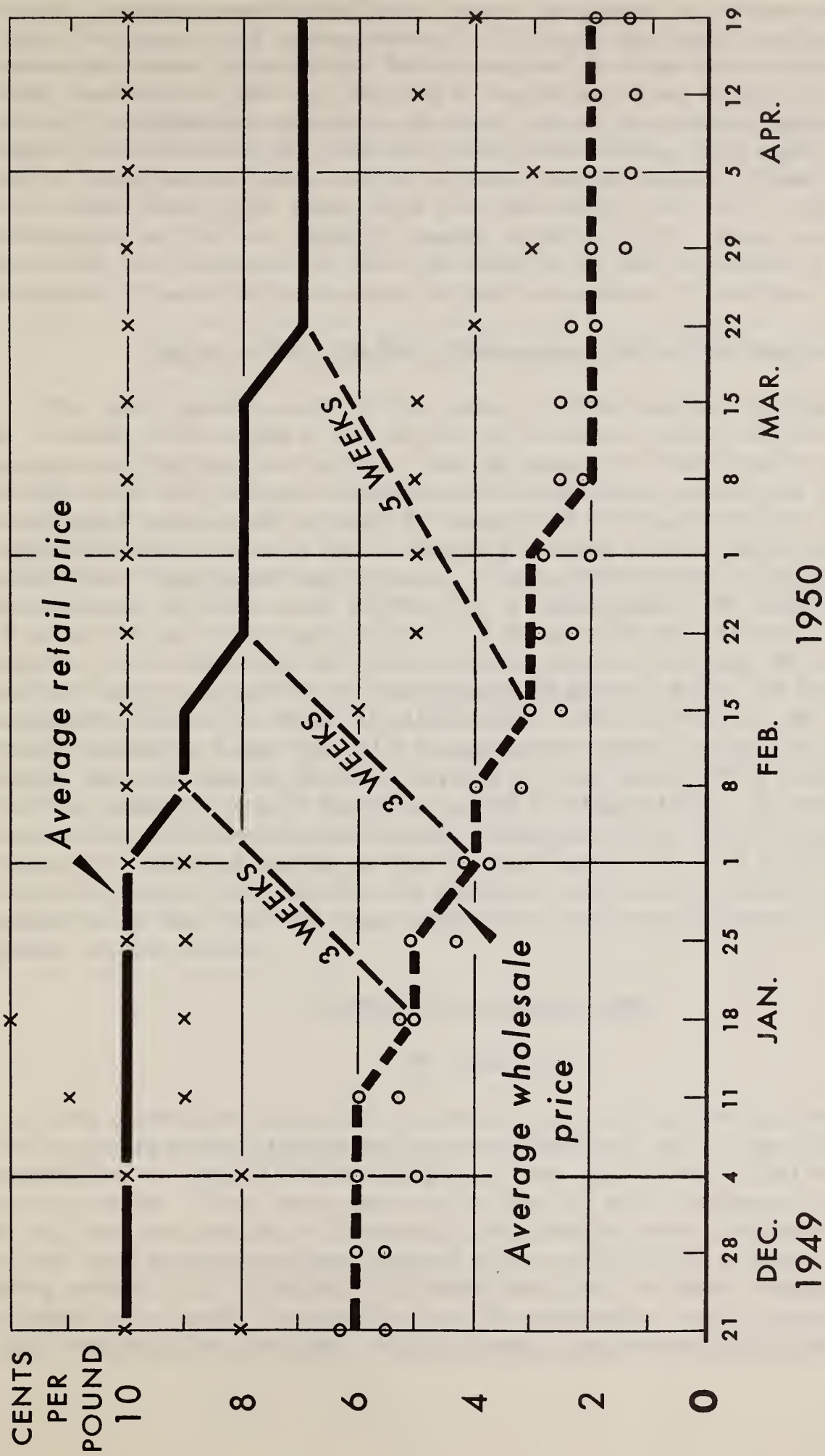
bargaining for the sale of their butter. There were a number of reasons for the request. Changing market practices have resulted in very small quantities of butter being sold by dealers in wholesale quantities in the terminal markets, and it is on the basis of these sales that the present USDA and commercial quotations are released. Price premiums for butter, upgrading (i.e., the selling of butter on a grade higher than actual grade), and special conditions of sale have often resulted in the butter prices received by creameries being substantially different from those reported in the terminal markets. Also, because of the differences between the prices received and the terminal market quotations, the creameries had no basis for judging the adequacy of their returns in relation to other creameries, and they have had no factual basis for bargaining for better returns.

Trial methods of reporting were developed, and the collection of prices received by creameries for butter in Iowa was begun in September 1949. Thirty-nine creameries cooperated by reporting local wholesale job lot sales and wholesale bulk shipments of butter. These creameries comprised a random sample of private and cooperative creameries which sell butter independently; i.e., not through a federation or parent company. The sample included creameries of all sizes scattered throughout Iowa. In order that the prices reported by creameries could be summarized by grade, the grade of the butter sold by cooperating creameries was determined by Federal grading at the creamery once each three weeks.

To test the usefulness of the information gathered, the data are being summarized into a weekly report of net prices received for local wholesale job lots of butter in cartons and in parchment and for wholesale bulk butter. These reports are being sent on a trial basis to a sample of creameries, farmers, butter dealers, fluid milk cooperatives, and others. During the next fiscal year those persons receiving the report will be surveyed, and their opinions and suggestions asked in order that the value of the report to the industry can be determined. Following the survey, the results of the project will be issued. To date, the reports on butter prices received by creameries have shown that: (1) Differences in butter prices within grades reported by Iowa creameries were substantially wider than those reported in Chicago and New York, especially for B-grade butter. (2) The difference in prices between A-grade and B-grade butter reported by Iowa creameries averaged only 0.3 cents from September 1949 through April 1950, as compared with about 1.25 cents in Chicago and New York. (3) To a considerable extent, price ranges for A-grade and B-grade butter, as reported by Iowa creameries, overlap. In any week, a good deal of B-grade butter sold at higher prices than some A-grade butter. In some weeks one or more B-grade lots sold for a higher price than any A-grade lots or one or more A-grade lots sold for a lower price than any B-grade lots. (4) Iowa prices for Grade B butter usually were above prices reported in Chicago and New York less shipping costs from Iowa. (See figure 8, which compares net prices received in Iowa with New York quotations less average shipping costs, and shows the much greater range in prices actually received in Iowa as compared with the reported price range in New York.)

Adoption of Uniform Terms for Use in Reporting Market News

A study of terms used in market news reporting of market tone, demand, activity, and prices for livestock was completed in June 1949, and it was brought out that not



X RETAIL PRICE RANGE ELIMINATING EXTREME HIGHEST AND LOWEST 10 PERCENT
 O RANGE OF "MOSTLY" WHOLESALE PRICES

Figure 8.--Prices for grade B butter received by Iowa creameries and New York commercial quotations less average shipping costs from Iowa.

1. The first part of the paper is devoted to a general discussion of the problem.

2. The second part is devoted to a detailed study of the case of a single



3. The third part is devoted to a detailed study of the case of a single

only was there a large number and wide variety of terms being used, but that each reporter was using somewhat different terms with apparently different meanings. Such lack of uniformity, of course, makes it difficult for farmers and other users to compare the market opportunities between markets. In cooperation with the Livestock Market News Service, a meeting was held at Des Moines, Iowa, October 29 and 30, 1949, with all the Midwestern livestock reporters, and at the meeting, uniform terms were adopted for use in all the livestock market news offices. As a result of the meeting, a folder was published for public distribution entitled "Terms Used in Livestock Market News." This folder sets forth the order to be used in reporting market information as follows: Supply, demand, trade activity, price trend and price quotations, and clearance. It lists the terms to be used in reporting each of these categories of market information and defines the meaning of each term.

Extent of Need for Daily Mimeographed Market News Reports

The rapid postwar growth in the number of radio stations carrying market news up to nearly 1,200 raised a question as to the extent of the need for daily mimeographed reports sent out by mail, and the extent to which weekly mimeographed reviews would fill the need. Broadcasts of market news, though not as complete as mimeographed reports, are received by farmers and the trade much more quickly. Also, market information carried by newspapers sometimes reaches users faster than the mimeographed reports sent out by mail. To help reduce possible duplication in the dissemination of market news information, a questionnaire was added to the annual circularization letter sent to the 15,269 users of the livestock mimeographed reports. It was found that 67 percent of the persons receiving daily mimeographed reports listen to broadcasts of market news; 70 percent obtain the information from newspapers. Sixteen of the 29 livestock market news offices received less than 100 returns indicating a need for daily mimeographed reports. In these 16 offices it was thought that the cost of the daily reports did not justify their being issued, and that the number of reports could be reduced in other offices. To date these daily reports have been discontinued in every livestock office but 6; some offices have reduced the number of reports to two or three days a week; and 6 offices have discontinued issuing any reports. No apparent reduction in service to livestock producers and the trade has been evidenced by the reduced number of daily mimeographed reports issued.

Survey of Use of Market News

By Slaughterers

Some uncertainty existed as to how well the livestock Market News Service was serving the wholesale slaughterers in the northeastern part of the United States. A representative sample of these slaughterers was interviewed to determine how well the service was filling their needs and to find out what improvements could be made. It was found that the use of livestock market news by these slaughterers was limited a great deal because many were unaware of the availability of some of the reports being issued. Also, although it is quite important for these slaughterers to get information as quickly as possible from the midwestern markets, many were unaware that they could get the USDA reports through the Western Union Commercial News

Dispatch Service, or by airmail--if they furnished airmail stamps to the market news offices. It was recommended that a circular letter be sent to livestock slaughterers informing them of the reports issued and the various ways of obtaining the information. It was also recommended that in the livestock reports salable receipts be broken down into (1) percentage of stockyard sales of livestock for slaughter, and (2) percentage of sales for stockers and feeders; and the amount of the direct shipments to packers should be reported in the major midwestern markets. This breakdown would be more useful to slaughterers than the present method of reporting only "salable" receipts.

By Iowa Farmers

In order to get a measure of how well market news is serving the farmers' needs, a study was carried on under a cooperative agreement with Iowa State College to determine (1) the usefulness of the different media (radio, newspaper, bulletin board, mimeographed report, etc.) in getting market news to Iowa farmers, and (2) the extent to which present market news is meeting the Iowa farmers' needs. During the fall of 1949, 600 Iowa farmers and 250 Iowa landlords were interviewed. Much of the data have now been tabulated, and these data are being analyzed. Three publications are to be prepared from the study for use by market news workers in improving the effectiveness of the service: "What Does the Iowa Farmer Want in Radio Market News"; "What Does the Iowa Farmer Want in Newspaper Market News"; and "How Iowa Farmers Obtain and Use Market News."

POSSIBILITIES OF DEVELOPING USEFUL RETAIL MARKET NEWS

The end goal of agricultural production and marketing is the retail sale, yet the Department's Market News Service has been largely limited to reporting at the wholesale level. Under this study, alternative methods of reporting retail market news are being explored; also, the costs and possible benefits will be studied so that an informed decision may be made as to whether or not it would be desirable to undertake such a service as an aid to the effective marketing of farm products. The work encompasses: (1) A review, as a background, of past efforts to report retail market news, and a study of contributions that existing retail market news services are making to the marketing of agricultural products. (2) The running of an experimental retail market news service in Baltimore, Md., to test the effectiveness of sampling in reporting retail prices and volume of sales, to test and perfect methods of operation, and to determine costs. (3) The distribution of retail market news reports from Baltimore to producers, shippers, wholesalers, retailers, and consumers, together with a survey of each group to determine the uses and extent of those uses to which the information is actually put. (4) An analysis of the findings and experiences gained in the preceding three points and the formulating of conclusions regarding the feasibility of retail market news services.

Review and Study of Past and Present Retail Market News Services

During the past year all known efforts in retail market news reporting that have been or are now being conducted by governmental agencies were studied. The

purpose of the study was to determine what, if any, contributions these services are making to the marketing of agricultural commodities. Four services were found that are at the present time reporting weekly on retail prices of perishable foods that are in general supply in the market. These are operated by State or local governments in the following cities: In Boston, by the Division of Markets, Massachusetts State Department of Agriculture; in Providence, by the Bureau of Markets, Rhode Island State Department of Markets and Conservation; in New York City, by the Division of Consumers' Service and Research, New York City Department of Markets; and in Baltimore, by the Maryland State Department of Markets in cooperation with the Extension Service of the Department of Agriculture.

A monthly report is issued by the New Jersey State Department of Labor and Industry which includes "Average Retail Prices of Food Articles in New Jersey."

The users of the published retail market news reports issued in Boston, Providence, and New Jersey were surveyed in July 1949, and the information obtained from the Boston and Providence surveys has been tabulated. The following listing shows the kinds of users found:

<u>Occupation</u>	<u>Boston</u> <u>Percent of total</u>	<u>Providence</u> <u>Percent of total</u>
Farmers	15.4	43.6
Farm advisers	6.9	11.2
Food dealers	9.3	25.1
Consumers	28.5	6.9
Consumer advisers	27.7	3.1
Others	<u>12.2</u>	<u>10.1</u>
Total	100.0	100.0

Approximately 99 percent of the farmers who received the Boston report and 89 percent who received the Providence report said they used the information. The most frequent use mentioned by farmers was as a guide in determining what to charge. Approximately 92 percent of the consumers who receive the Boston report and 89 percent who receive the Providence report said they used the information. The use most frequently mentioned by consumers was as a guide in buying, both from the standpoint of what to pay and what was available on the market or was in abundant supply. In both Boston and Providence, more subscribers were found to use price information on fresh vegetables than the price information for any other group of commodities.

Experimental Retail Market News Service in Baltimore, Md.

The collection of retail price and volume information in Baltimore, Md., on a trial basis for a representative sample of the stores, was begun in May 1949, and with experience, the effort was gradually expanded to the reporting of 125 agricultural food items including canned, frozen, and fresh fruits and vegetables, meats, and dairy and poultry products. The sampling error in reporting price changes at the 95-percent probability level was found to be less than one cent for all the items

except for an occasional seasonal product, such as strawberries, at the beginning and ending of the crop season. The reporting of accurate information on volume of sales for the city of Baltimore proved to be much more difficult to collect than accurate price information. The enumerators visited the sample stores each week and took invoices of stocks on hand. In cooperation with store managers, the invoice records were reviewed to determine purchases for the previous week. Net sales were computed by adding beginning-of-the-week inventories to purchases and subtracting end-of-the-week inventories.

In cooperation with the Bureau of Agricultural Economics, statistical analyses have been made of data collected, which will be basic in specifying the size and design of samples for purposes of reporting volume of sales. For a random sample of 50 stores it was found that the sampling error in all but a relatively few cases exceeded estimates of monthly change in sales. Tests are now being made with bi-monthly data.

Cost records have been kept throughout the Baltimore pilot operation, and the data gathered provide information as to costs of collecting retail market news information and costs of analyzing and releasing reports.

Evaluation of Usefulness of Retail Market News Information

For purposes of evaluating the usefulness of statistically accurate retail market news information, a monthly report on the volume of frozen food deliveries to stores was publicly released beginning September 1949; a weekly retail price report entitled "Retail Market Report for Baltimore" was publicly released for distribution beginning in January 1950. The latter gives average retail prices, price changes from previous week, and price ranges for 125 agricultural food items including canned, frozen and fresh fruits and vegetables, meats, and dairy and poultry products. A weekly report entitled "Retail and Wholesale Prices and Price Changes for Fresh Fruits and Vegetables" was released beginning in May 1950. This report gives retail prices for fresh fruits and vegetables, wholesale prices expressed in retail selling units, price differences between wholesale and retail, and price changes from previous week. The mailing list of persons receiving the various reports consists of approximately 6,400 persons--retail store operators, packers, distributors, wholesalers, and farmers. To test the usefulness of this type of data to consumers, the Maryland State Department of Markets has been distributing our retail price data to approximately 600 consumers and has been using the data as a basis for a local radio program.

At present the persons receiving the Baltimore reports are being surveyed in order to determine the uses, if any, to which the information is being put, and what benefits would result from the reporting of retail market news information on a continuing basis. Unsolicited response from retail food stores and from frozen food distributors has been very favorable.

Analysis of Findings and Experiences and Formulation of Conclusions

An analysis of the data gathered to date indicates that there is ample opportunity for retail stores, particularly the small independent stores, to make use of

such reports in doing a better job of pricing. It was found that while retail prices generally move upward quickly following a wholesale price increase, they frequently lag behind a wholesale price decline. This failure to adjust retail prices to wholesale declines means that price concessions made by producers and processors are not reflected on to the consumer and the desired increase in sales is not accomplished. Instead of being relieved, the supply situation at wholesale becomes aggravated and prices even further depressed than they otherwise would be. For illustrations of lack of coordination between retail and wholesale prices see figure 9 which compares Baltimore wholesale and retail prices for yellow onions during a price decline. Before the decline, the difference between wholesale and retail prices averaged 4 cents a pound or 40 percent of the consumer dollar. The first two wholesale price declines were followed three weeks later by retail price declines. The third wholesale price decline was followed by a decline in retail prices five weeks later. The fourth wholesale price decline brought no retail price adjustment. The differences between average wholesale and retail prices then stabilized at 5 cents a pound or 70 percent of the consumer dollar. It can be noted from the retail price ranges that certain of the stores made good price adjustments, but that other stores kept their prices steady at 10 cents a pound. It is to these stores that are slow in their price responses, that our efforts under this study will be especially directed in order to encourage more effective retail pricing.

It was also found that retail margins taken do not necessarily have any relationship to costs of handling individual commodities (for example, the margin taken on strawberries during certain months of the year was lower than that taken on potatoes, and many of the margins taken vary widely from month to month depending primarily on the demand situation at retail and the supply situation at wholesale). Many of the smaller stores were found to be very irregular in the products they carry on their shelves, and often did not carry those items most in need of sales promotion. The evaluation of uses of retail market news will include the extent to which such information can contribute to the solution of these problems.

Need for Market Information on Frozen Foods

During fiscal year 1949 the Branch initiated a study to determine (1) what statistical information is needed by the frozen food industry to facilitate the planning of its production and the marketing of its products, and (2) the most feasible methods for collecting and disseminating this needed information.

Market information on production, stocks, prices, and consumption is currently published by the Federal government on fresh and canned fruits and vegetables, poultry, livestock, meats, dairy products, fish, grains, and other products. The main reports issued on frozen foods are monthly reports of the 30-day storage stocks of frozen foods in refrigerated warehouses and an experimental report which shows a breakdown of these stocks by container size for 9 frozen fruits and vegetables. Frozen food trade associations and trade magazines publish some statistical data that are of help to the industry, but it is felt that much of this material--both governmental and private--should be improved and coordinated before it can be of maximum value, and that there is a need for considerable additional marketing information.

To make sure that the study would cover the various phases of frozen food marketing and truly reflect the industry's needs, an advisory committee, made up of all segments of the trade as well as interested government people, was called upon to help plan the undertaking and to offer criticisms and suggestions as the work progressed.

During fiscal year 1950, a preliminary report was written analyzing present market news services for frozen commodities. This report contained suggestions as to possible improvements and expansions in frozen food market information. It points out a need for information on the following:

1. Movement of selected retail, institutional, and industrial frozen foods into consumption in key areas of distribution.
2. Production figures on quick-frozen eviscerated poultry and quick-frozen packaged fish.
3. More comprehensive coverage of storage stocks broken down by retail, institutional, and industrial sizes.
4. Storage holdings of quick-frozen eviscerated poultry and quick-frozen packaged fish broken down to show the type of trade for which they were packed.

It also recommends further investigation to determine the most feasible methods for collecting and disseminating this information and what the cost would be.

In the course of this study it was revealed that there is little coordination between various segments of the trade in planning marketing programs and that in general the industry has little knowledge of what the U. S. Department of Agriculture is set up to do or is doing in the way of marketing research. Therefore, the Committee unanimously expressed a desire and need to have official representation on the Department of Agriculture's advisory committees or to have an advisory committee to work with the Department on frozen food projects. Since the committee already contained representatives from all segments of the frozen food field, it felt that it contained the elements of such an advisory group.

STUDYING THE ADEQUACY OF GRADES AND STANDARDS

Uniform standards for trading in nearly all agricultural products have become increasingly necessary for efficient distribution as our markets have grown and as the volume of trading in interstate and foreign commerce has expanded. Yet, considerable difference of opinion exists within and without the Department of Agriculture, regarding the purpose of grading, the kind of grades that are needed, and the application of grading. For some commodities a number of conflicting standards for grades are in force in various parts of the country. Commercial grading is not always in accord with U. S. grades, and there is no clear delineation as to the kind of standards for grades most suitable at the different levels of trading.

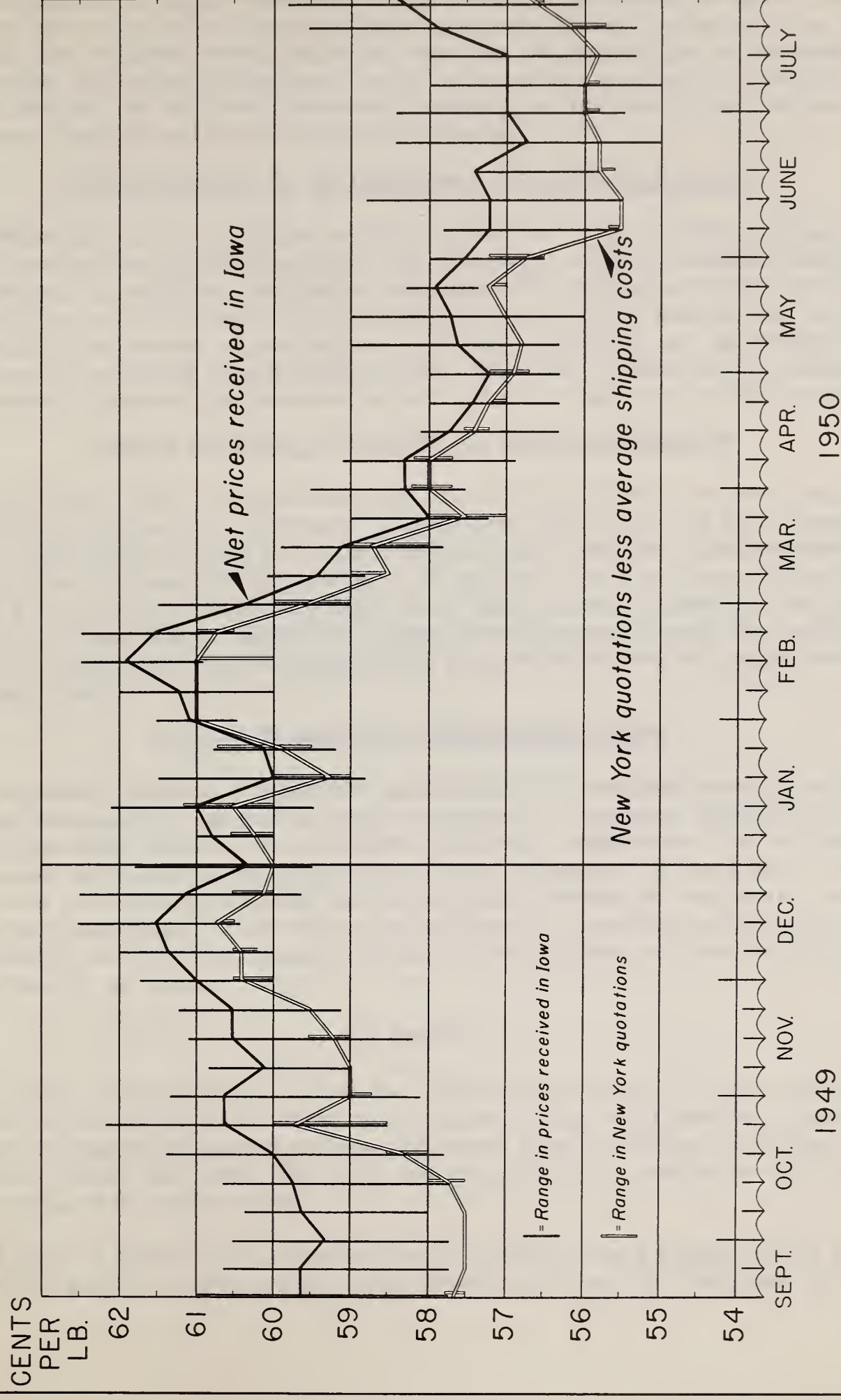


Figure 9.--Prices of U. S. No. 1 yellow onions in Baltimore, Md.

1000



This study on the "Adequacy of Grades and Standards" is being directed to the establishment of criteria to be used in improving the standards for grades now in use, and improving the application of grade standards by the Department. Also, work is being done to reduce market confusion caused by the multiplicity of standards so that buying and selling efficiency can be increased and consumers and other non-experts can buy and sell with reasonable knowledge of the commodities. During the year these lines of activity included the following:

Basic Principles in the Development of Grade Specifications

The original Acts of Congress which formed the basis of USDA grading, the various publications touching on grades and standards, and the standards themselves were studied. In addition, consultation with commodity experts and others has aided in clarifying past and present ideas regarding the purposes of grading, the policies of the U. S. Department of Agriculture relating to grading, and the methods and bases used to establish standards for grades. An effort is being made to evaluate the adequacy of present principles in the light of modern marketing of farm products.

Coverage and Extent of Use of U. S. Grades and Standards

At present there are approximately 380 U. S. standards, and work has been started to determine the percentage of production and/or sales of each commodity that is graded under Federal and State standards. Also, data are being developed on increases and decreases in the uses of U. S. standards for each commodity so as to permit a study of the conditions under which their use has expanded or declined. With this information as background, those grading programs which are generally found to be most useful can be compared with those which are not and suggestions for improvement made.

Relation Between U. S. and Commercial Grades

In general, Department grades are established on a tentative basis after meetings and hearings with interested groups of producers, consumers, distributors, and other interested parties. The testimony, opinions, suggestions, and criticisms offered are appraised by the Department's commodity experts in the light of their experience and research findings and in the best interests of the public, before grades are established. Little effort has been made to associate grades with price or to weight the individual quality factors on which grades are based according to prices paid by the market.

For Poultry

To test the feasibility of using the relationships between price and quality as a basis for improving grade standards, a study of the relationships of quality factors to price of ice-packed broilers and fryers from the Del-Mar-Va Peninsula was started in fiscal year 1949. This study has been carried to completion and a manuscript prepared for publication.

A total of 33,720 birds, from four poultry packing plants representative of the Del-Mar-Va poultry producing area, were inspected for quality. The boxes of birds

were traced to 32 New York wholesale buyers, and the wholesale selling prices were obtained. It was found that the different quality factors do have measurably different effects on prices paid. For example, it was found that bruising and/or fleshing affected the prices about $2\frac{1}{2}$ times as much as pinfeathers and/or tears, and that if U. S. grades are to be tailored to fit market demands better, some such weighting of quality factors should be done. Commercial grades were found to differ from comparable U. S. grades in (1) the level of quality packed in each grade, (2) the percentage tolerance of undergrade quality permitted, (3) consideration given to feed in the crop as a determinant of grade. In addition, commercial grading permits certain special grades packed for specific segments of the trade. No counterpart to these special grades existed in U. S. standards, and these special grades resulted in a higher price for a portion of the birds marketed than would have been possible under U. S. grades. Strong supporting evidence was found that the U. S. Department of Agriculture in its grading should reweight the quality factors used in grades and adopt some of the practices used in commercial grading if the grading service is more nearly to satisfy market requirements and hence become more widely used.

For Tobacco

Although nearly all the tobacco in the United States is now graded under the Tobacco Inspection Act of 1935, these grades are not used by the tobacco companies in obtaining their supplies--rather, all buying is done on the basis of personal inspection of individual lots. This practice adds to the cost of marketing, and farmers frequently find that the U. S. grades on their tobacco are not closely related to prices paid. To explore the problem of making U. S. grades more useful, data for a pilot study were gathered during fiscal year 1949 on a small random sample of Burley tobacco, each lot of which was graded in turn by three graders. Analysis of the data was completed, and a manuscript prepared for administrative use. Results indicated that research is needed on the effect on price of variability of tobacco within baskets, consistency of judgment among graders, methods of reducing the variability of judgment among graders, and price-quality relationships as a basis for improving grades.

Variations by Graders in Rating Quality

Uniformity in applying grades is necessary in order for the grades to have meaning and for the public to have confidence in them. Hence, this study was undertaken, along with the study described above, in order to measure the extent of inconsistency, if any, among graders so that it could be reduced. A comparison of gradings on a large quantity of poultry involved showed that (1) differences of judgment exist among graders, (2) differences in judgment are of varying sizes in different levels of quality, and (3) differences in judgment are not uniform in all quality factors. The study indicated that the problem of adjusting inconsistencies among graders is one of improving consistency in judging each quality factor. Suggestions toward improving uniformity in applying grades were made as follows: (1) The descriptive language used in grade specifications could be reviewed in order to define terms more exactly. (2) A greater use of visual models would aid graders in maintaining uniformity of judging quality. (3) Frequent refresher training courses for judging quality characteristics would also aid graders in maintaining uniformity.

Uniform Presentation of U. S. Grades and Standards

The lack of uniformity in the makeup of possible grades and standards makes it unnecessarily difficult for nonexperts to determine the provisions of various grades. The lack of uniformity in the size of publications and in style makes difficult the assembling of grade standards in series for filing and binding. Therefore, a review of the methods of presenting standards and grades was started during fiscal year 1949 and completed in fiscal year 1950. It was found that (1) the contents of most published grade standards were arranged under one of three plans, (2) 85 percent of grade standards are mimeographed and 15 percent are printed--a number are issued as reprints from the Federal Register, and (3) sizes of the published standards vary, ranging from 3½ by 5¾ inches to 8½ by 11 inches. Costs of reproduction were determined for various quantities by mimeograph, multilith, offset printing, and letter press. Recommendations were made that (1) a uniform method of arrangement of contents be adopted and a suggested form was presented; (2) standards be reproduced in pamphlet size for convenience in carrying and to facilitate filing and binding; and (3) appearance and readability be considered as well as cost in selecting the method of reproduction and type of paper used.

Comparison of State and U. S. Standards for Eggs

In order to bring about more uniformity and thus increase their use, comparisons of State and U. S. grades for eggs were made during the past year. A manuscript entitled "Variations in State Standards and Grades for Eggs" has been completed and is already in its second printing. Results showed that the grades and standards for various States are more uniform than in 1944, when a similar study was made, but that considerable variability still exists.

Need for Additional Butter Grade

During the fiscal year representations were made to the Department of Agriculture that a grade of butter intermediate between Grades "A" and "B" should be established as a U. S. grade standard for butter for the reason that the trade was making a price distinction for this kind of butter. Data giving detailed grading of butter and prices paid were available from the work discussed under "Improvement of the Effectiveness of Wholesale Market News Service." These data were analyzed using analysis of variance to show the extent to which the wholesale market recognized such an intermediate grade. No evidence was obtained that a grade between Grades A and B was in fact recognized by the trade through prices paid creameries. A report of this work was made for the use of the Dairy Branch, Production and Marketing Administration.

MISCELLANEOUS ACTIVITIES

APPRAISAL OF THE EFFECTS OF TECHNOLOGICAL CHANGE ON AGRICULTURAL MARKETING

Recent technological innovations have had a profound effect on the whole organization of the American economy. A study of the effects of such changes on farm production and management was made in 1940. Nothing similar is available as to the obviously important changes which have taken place in the marketing of agricultural products or the directions in which these changes are tending. The Agricultural Research Policy Committee felt that a careful appraisal of the changes caused by technological changes, and the trends revealed could be of considerable help in its work in outlining research policy in agricultural marketing. The Committee accordingly suggested that such a study be made, and it is being conducted jointly by the Bureau of Agricultural Economics, Production and Marketing Administration, and Agricultural Research Administration. The study as outlined calls for the gathering together and critical interpretation of available data, rather than any major amount of original research. This Branch has the assignment of fulfilling PMA's responsibility in this work.

Representatives of this Branch worked with the Bureau of Agricultural Economics in exploring the kind of data available and the best approach to this work. It was finally decided to limit the initial work to changes in the marketing of food products and to work from a functional (as opposed to a commodity) viewpoint. The appraisal has been tentatively outlined under nine fields: (1) Historical background, (2) food processing, (3) transportation, (4) storage and warehousing, (5) packaging, (6) communications, (7) wholesaling, (8) retailing, and (9) the home.

This Branch has the responsibility for gathering and analyzing the data in all fields except historical background, food processing, and the home, and preparing the chapters covering these subjects. As soon as sufficient data were available to prepare tentative outlines of each field, a series of meetings were held with Experimental Station representatives in both the production and the marketing fields to discuss the outlines with them, get their suggestions on modifications, and find out from them what materials and information they could contribute.

It has become apparent, from the data and appraisals gathered in these meetings and previous research, that the marketing system for farm products has undergone a major revolution within the current generation. The outline being worked out by the cooperating agencies indicates that the marketing structure is being materially changed for adaptation to truck transportation, a new network of speedy communications and information, new forms of retailing--especially the supermarket--and new changes in food habits brought about by new methods of urban living and better incomes and made possible by new developments in food technology. It has also become clear that the adaptations so far made in the marketing system are far from perfect, and that much research is needed to determine those adaptations necessary to move the system in the direction of greatest efficiency in moving the foods the consumer wants through the marketing system at least cost.

Completion of the report is dependent in part on the final release date sometime during the summer of 1950, of the summaries of the 1949 Census of Business. It is believed that other gaps in available data will be filled by the time these releases are received. A complete report on the food marketing phase should be ready for publication before the end of the next fiscal year.

POSSIBILITY OF INCREASING THE DEMAND FOR MOHAIR

A large part of the supply of mohair fiber has always gone into plush upholstery for automobiles, parlor furniture, and public vehicles. Much of this market vanished shortly after the war with the growth in the use of slip covers in the home and the need for a more "slidable" automobile upholstery with the new wide seats in cars. When warehouses in producing areas were stocked with heavy unsalable surpluses in the fall of 1948, the goat raisers approached the Department for help. They agreed to pay one-third of the cost of research into the demand situation and methods of improving the demand. A contract was signed in late fiscal year 1949 with a private research organization which had the services of an experienced textile engineer. The contract called for:

1. A preliminary reconnaissance survey of the textile industry to determine the extent and nature of the possible demand for mohair fiber.
2. The designing of suitable yarns, blends, and textiles to meet possible new uses.
3. Blending, spinning, weaving, finishing, and dyeing and testing of experimental quantities of the yarns and textiles developed.
4. Production of sample end products from these experimental textiles in each of the product classes showing promise.
5. Exhibiting these yarns, textiles, and products to textile manufacturers and users to obtain their reactions and arouse their interest.
6. Measurement of the potential market for each class of fiber which could be realized through these products, and analysis of changes which might be advisable in marketing methods.

The reconnaissance survey indicated that little possibility existed for expansion of the traditional markets for mohair, but that the possibilities for new markets in mohair blends with synthetics appeared bright, provided the proper blend, yarn, and fabric designs could be developed, especially for blends which would fit in price between the all-rayon textiles and the worsted and woolen textiles. A 50-50 blend of mohair and viscose rayon seemed to meet both the technical and market requirements. In conjunction with cooperating elements in the textile industry, the contractor has designed 10 basic workable blends, solved the production problems, and produced experimental quantities of the necessary yarns, and is currently

working on the production of a number of textiles and sample end products from these textiles. Seven sample knitwear products are already completed and seem to show considerable promise of marketability--four types of men's sport socks, and three sample sweaters (one each, men's, women's, and children's). The children's sweater, in particular, has already aroused the interest of the buyer for a large high-grade department store. In addition, an experimental high-grade men's sport shirt has been made up in an alpaca-type fabric by a major shirt manufacturer interested in exploring the possibilities. A corduroy fabric, already completed, has shown such definite advantages over current types that another manufacturer is actively interested in its further development. Four woven fabrics in men's and women's suitings have been completed, and four more are being dyed and finished, all showing very real promise. A leading dress manufacturer is already experimenting in the production of a women's suit from one of these fabrics. Many of the twelve fabrics in a less complete stage at present show equal promise.

When finished, these textiles and products will be exhibited to the industry, and an analysis of the potential demand for each class of fiber made. Success of this project could show the way for producers to broaden the demand for mohair sufficiently to relieve them from dependence on the whims of a single end use.

LIST OF PUBLICATIONS RECENTLY RELEASED
(INCLUDING THOSE TO BE RELEASED WITHIN THE NEXT FEW MONTHS)
BY THE MARKETING AND FACILITIES RESEARCH BRANCH

1. The wholesale market for fruits, vegetables, poultry, and eggs in Jackson, Miss.
2. The wholesale market for fruits, vegetables, poultry, and eggs in New Haven, Conn.
3. The wholesale fruit and vegetable market of Miami, Fla.
4. The wholesale fruit and vegetable markets of Tampa, Fla.
5. The wholesale markets for fruits, vegetables, poultry, and eggs in Atlanta, Ga.
6. The wholesale market for fruits, vegetables, poultry, and eggs in Hartford, Conn.
7. The wholesale market for fruits, vegetables, poultry, and eggs in Columbus, Ohio
8. The wholesale market for fruits, vegetables, poultry, and eggs in Baton Rouge, La.
9. The wholesale market for fruits, vegetables, poultry, and eggs at Richmond, Va.
10. The Benton Harbor fruit market at Benton Harbor, Mich.
11. The wholesale market for fruits, vegetables, meat and meat products, poultry, eggs, and other produce at Houston, Tex.
12. The Columbia, S. C., produce markets
13. The wholesale markets for fruits, vegetables, poultry, and eggs at Greenville, S. C.
14. Concentration markets for fruits and vegetables in Sumter and Lake Counties, Fla.
15. The wholesale produce market at St. Louis, Mo.
16. The wholesale markets for fruits, vegetables, poultry, and eggs in Greater Little Rock, Ark.
17. The wholesale produce market at Milwaukee, Wis.
18. The wholesale market for fruits, vegetables, poultry, and eggs at Savannah, Ga.
19. The wholesale markets for fruits, vegetables, poultry, and eggs at Tulsa, Okla.
20. The wholesale produce market at Indianapolis, Ind.
21. The Raleigh, N. C., produce markets
22. The wholesale produce market at Norfolk, Va.
23. East Texas produce markets and plans for new markets at Tyler and Jacksonville, Tex.
24. The wholesale produce markets at Boston, Mass.
25. Supplement to a report entitled "The wholesale market for fruits, vegetables, poultry, and eggs in New Haven, Conn."
26. The wholesale market for fresh fruits, vegetables, poultry, and eggs in Louisville, Ky.

27. The wholesale produce market at Huntington, W. Va.
28. A study of marketing facilities of San Juan, Puerto Rico
29. The relation between locker plants and home freezers in the distribution of frozen foods in Arizona (part 1)
30. Farmers' produce markets in the United States (part 1 - history and description)
31. Marketing frozen foods--facilities and methods
32. Wholesale poultry and egg markets in 30 cities
33. How fresh fruit and vegetable distributors can get more out of their materials-handling equipment
34. An improved method of stacking standard density bales of cotton in "cordwood" arrangement
35. A comparison of two-wheel hand trucks and clamp-type industrial trucks for transporting uncompressed bales of cotton from blocked area to dinky press
36. An evaluation of the portable platform type scale as used in cotton compresses and warehouses
37. The checkout operation in retail food stores
38. Marketing Florida prepackaged sweet corn.
39. Prepackaging apples in the Northwest
40. Prepackaging spinach and kale at terminal point
41. Prepackaging broccoli in Florida
42. Prepackaging cauliflower in Florida
43. Prepackaging sweet corn in Florida
44. Prepackaging cherries at shipping point
45. Prepackaging tomatoes at terminal markets
46. Retailing prepackaged meats
47. Cost of rewrapping prepackaged meat and poultry products
48. Consumer buying practices and preferences for purchasing oranges by weight or count in selected cities
49. Consumer preferences for purchasing oranges in bag or in bulk in selected cities
50. Consumer preferences for purchasing oranges in various size mesh bags in selected cities
51. The merchandising of reconstituted frozen orange concentrate through the medium of mechanical dispensers in selected cities
52. Test of refrigerator car equipped with split-absorption system of refrigeration

53. A limited comparative study of railroad refrigerator cars
54. Effects of the lack of reciprocal switching between railroads upon the marketing of farm products at Baltimore, Md., and Philadelphia, Pa.
55. Terminal delays to loaded freight cars
56. Railroad and truck refrigeration for the protection of frozen citrus concentrate from Florida
57. A comparative study of packing, transportation, and refrigeration costs of bushel baskets and wire-bound boxes for transportation of peaches
58. Reduction of loss and damage in rail transportation of shell eggs by improved loading and bracing
59. Loss and damage in rail transportation of watermelons
60. Reduction of loss and damage in the transportation of lettuce and carrots
61. Loading methods and loss and damage of various commodities
62. Program analysis--improving the effectiveness of wholesale market news services
63. The market news reporting job
64. Reproduction of market news reports
65. Improving the reading ease of market news reports
66. The market news services of the U. S. Department of Agriculture
67. Uniform terminology for all market news services
68. Prices received by Iowa creameries for butter (weekly)
69. Report on market news meeting at Des Moines, Iowa
70. Terms used in livestock market news
71. Program for development of the market news services
72. Summary for program for development
73. The relative prices paid creameries for 91-score and 90-score butter
74. Reporting butter prices received by Iowa creameries
75. Use of USDA livestock market news by Northeastern slaughterers
76. Extent to which receivers of mimeographed livestock market reports also use livestock reports in newspapers and over radio
77. Market news reporting of prices received by creameries for butter
78. A national sample for retail market news
79. Retail market report for Baltimore (weekly)

80. Baltimore frozen food survey (monthly)
81. Retail and wholesale prices and price changes for fresh fruits and vegetables (weekly)
82. The market information needed on frozen foods
83. List of terms used to designate grades
84. Relationships between USDA standards and Federal specifications for dairy products
85. Grade terminology used in USDA standards
86. Form of presentation for USDA standards for grades
87. Variations in State standards and grades for eggs
88. A study of commercial and USDA poultry grades in relation to market acceptance
89. A study of the variations by graders in rating quality

